IRON & COAL

THE IRON AND COAL TRADES' REVIEW

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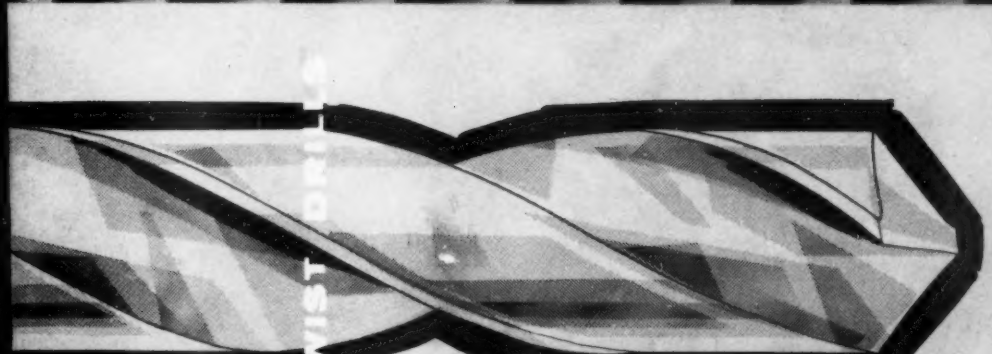
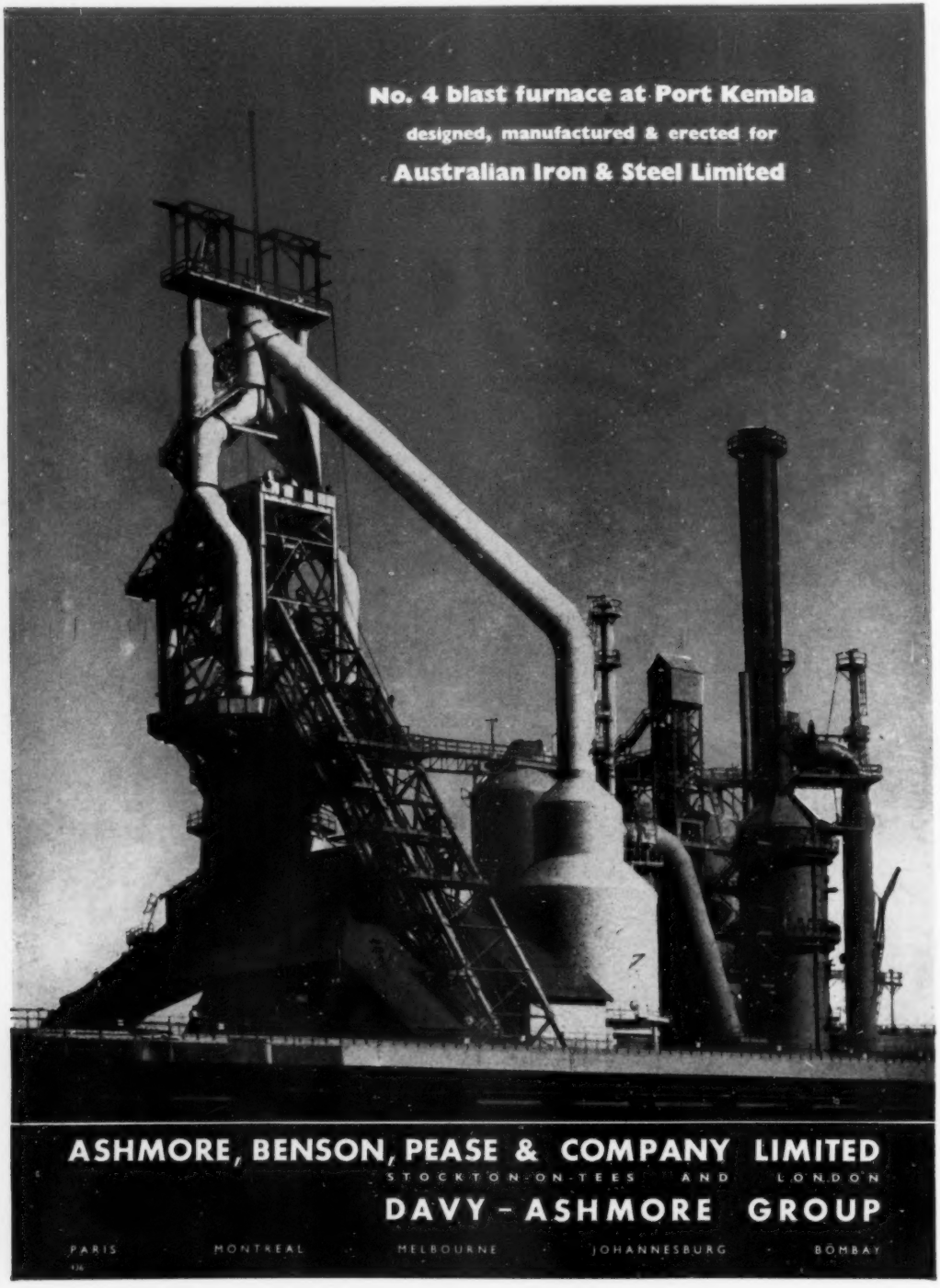


SUPREME AMONG TWIST DRILLS

DORMER

THE SHEFFIELD TWIST DRILL AND STEEL COMPANY LIMITED
SHEFFIELD ENGLAND

DORMER TOOLS ARE OBTAINABLE FROM YOUR USUAL ENGINEERS' MERCHANTS


No. 4 blast furnace at Port Kembla
designed, manufactured & erected for
Australian Iron & Steel Limited
ASHMORE, BENSON, PEASE & COMPANY LIMITED
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PARIS MONTREAL MELBOURNE JOHANNESBURG BOMBAY

Surface re-organisation

1 Skip discharge equipment
2 Dirt disposal equipment
3 A washery conveyor

Photographs by courtesy of the National Coal Board.

Sutcliffe service and equipment covers a wide range, including complete surface reorganisation schemes, washery conveyors, dirt disposal equipment and automatic skip discharge. Our unrivalled experience in surface conveying can be brought to bear effectively on *your* particular problem—send for our leaflet "Surface Handling", ref: IR/141 for full details.

Sutcliffe equipment takes good care of your coal

RICHARD SUTCLIFFE LTD., HORBURY, WAKEFIELD, ENGLAND

RS. 141

Better lamps—better lamprooms

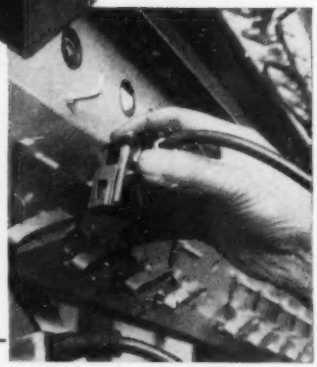
WITH THE NEW

PATTERSON CAP LAMPS

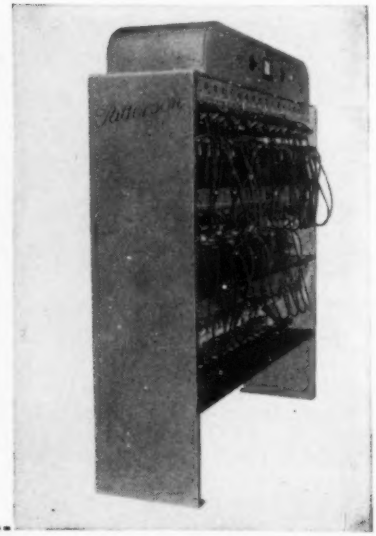
AND CHARGING RACK

Improved light output and long trouble-free life are features of the new Patterson cap lamps. Fitted with high grade reflectors, silver tipped contacts, and Exide lead-acid batteries, they work brilliantly without a flicker.

They are automatically kept at the peak of efficiency by the attractive new Patterson charging rack. This is based on the headpiece key-type charging system and is designed to increase lamproom efficiency and reduce lamproom labour.



The type SS 3 self-servicing cap lamp and headpiece. It fits any standard headpiece key-type charging equipment or can be used with the new Patterson charging rack.



To: PATTERSON LAMPS (1953) LIMITED
1 Second Avenue, Team Valley, Gateshead-on-Tyne 11
Please send me further details of your new cap lamp and charging rack.

NAME_____

ADDRESS_____

PATTERSON LAMPS (1953) LIMITED

Makers of Miners' Lamps and Lamproom Equipment for over 70 years

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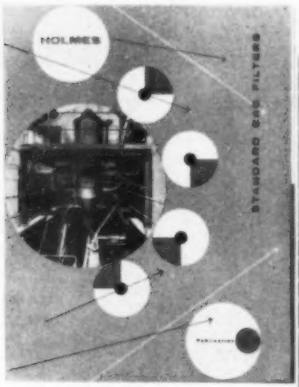
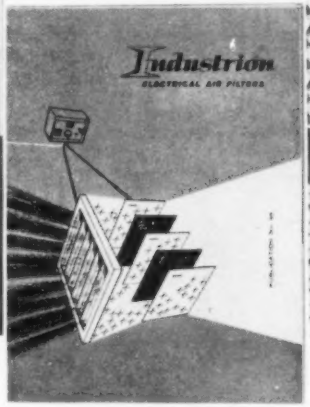
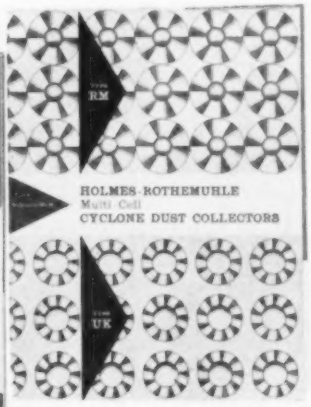
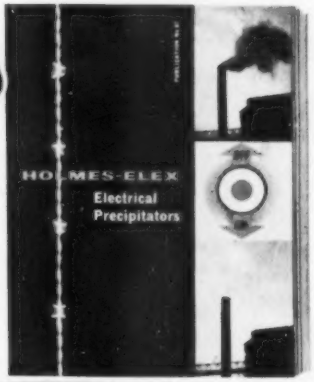
TGA P150A





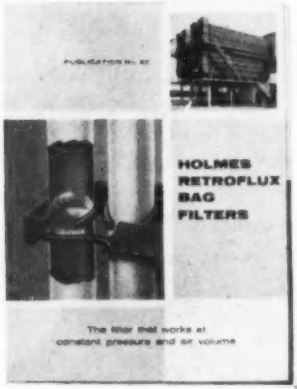


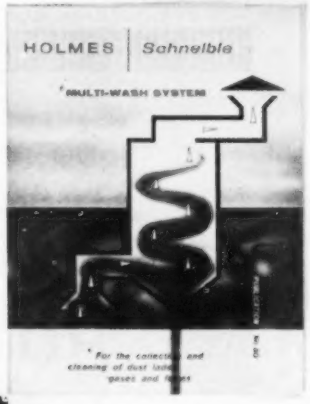
Which?



Which type of dust collection and control plant is most suitable, both technically and economically, for your particular application? A complete answer to this question lies within the pages of the various brochures illustrated. Have these brochures before you when you decide.

Ask for technical literature GCD/ 67.





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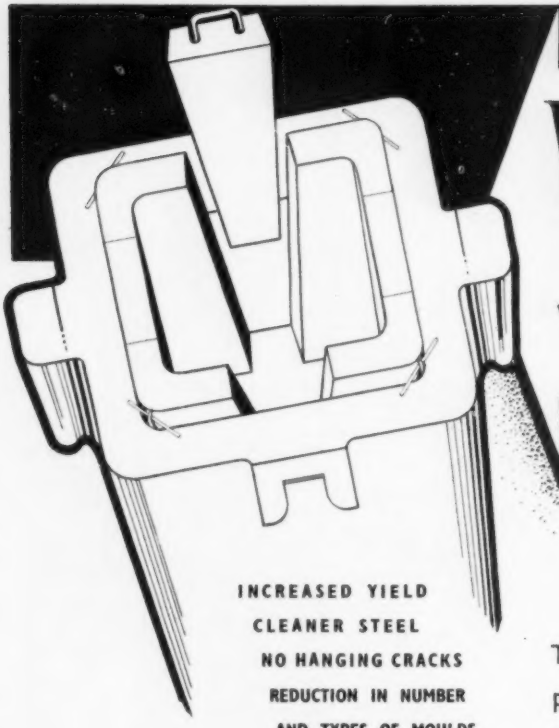

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for the
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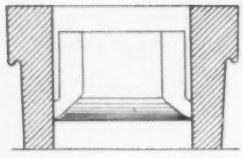
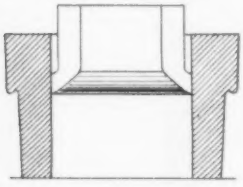
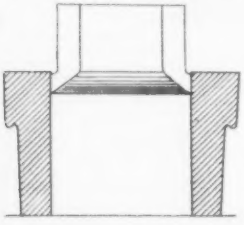
CLEANER STEEL
NO HANGING CRACKS
REDUCTION IN NUMBER AND TYPES OF MOULDS
INCREASED MOULD LIFE
REDUCED LABOUR COST
NO CAPITAL COST
NO CRANE WORK







Vallak Hot-Tops are in everyday use in 8cwt to 33 ton moulds

The 8 piece head with 4 corner tiles, presenting tapered faces to receive the 4 flat self wedging tiles, allows for the quick setting up of feeder heads in moulds where there is variation in mould dimensions.
Fitted by semi-skilled labour without the use of cranes, the tiles are robust and easily stored.

TAILORED INGOTS WITH EASE
reducing mould requirements, increasing mould life

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FOR BRITISH INDUSTRY

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The Steel Company of Wales
Consett Iron Co. Ltd.
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who have recently placed repeat orders for these reliable locomotives. Brush shunters can be specially built to meet any industrial requirements.

0-4-0 SHUNTERS

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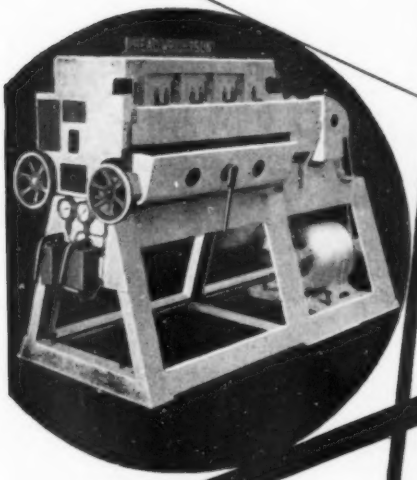
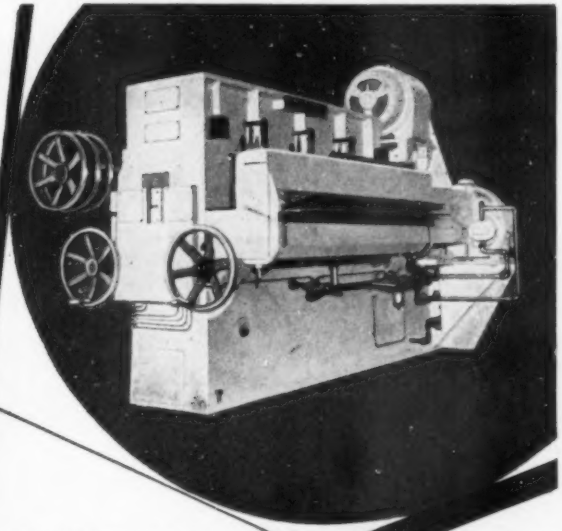
BRUSH ELECTRICAL ENGINEERING CO. LTD. LOUGHBOROUGH, ENGLAND *(Member of the Hawker Siddeley Group)*

BT12

aluminium foil or armour plate

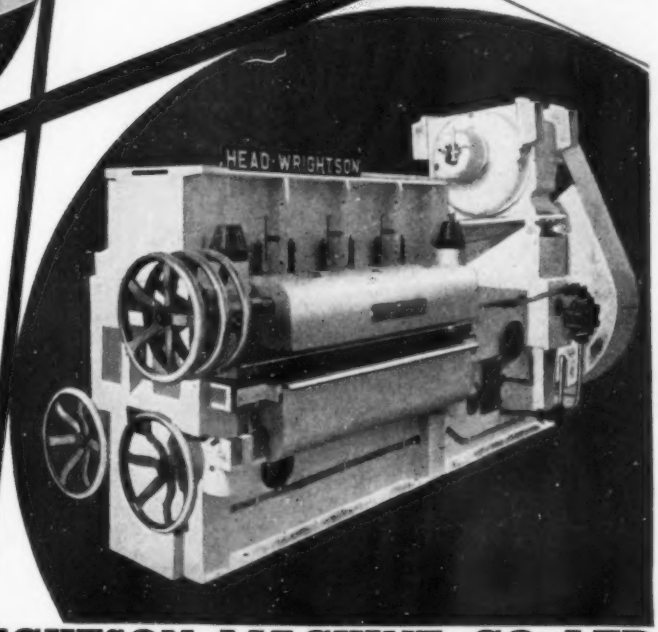
Left: 1⅛" Pressure Regulating Roller Leveller





Top: 1¾" Processor Leveller

Bottom: 2½" Pressure Regulating Roller Leveller



The Head Wrightson Machine Company manufactures a very wide range of roller levellers for levelling from aluminium foil to heavy steel plates. Further information is available on request and our Sales Engineering Department will be pleased to give advice. For immediate service telephone Middlesbrough 43401.

THE HEAD WRIGHTSON MACHINE CO LTD

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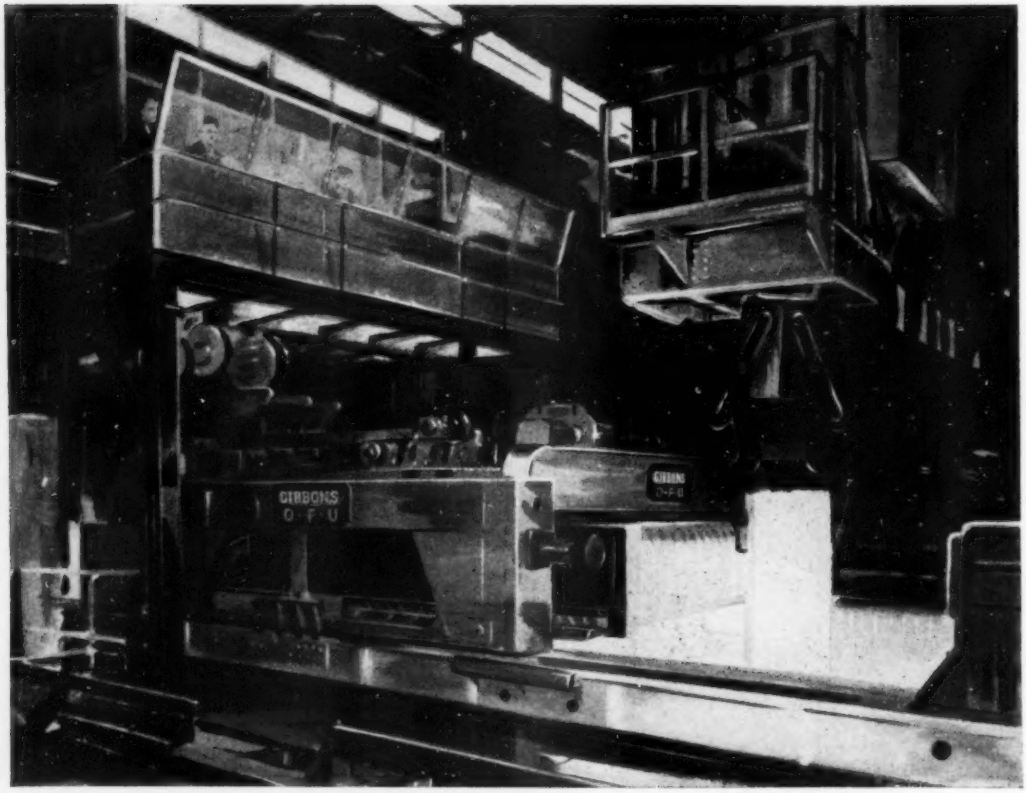
RECUPERATIVE SOAKING PITS



★ HIGH THERMAL EFFICIENCY GIVING MAXIMUM FUEL ECONOMY.

★ ABSOLUTE CONTROL OF FURNACE ATMOSPHERE WITH OXYGEN OVERRIDE CONTROL.

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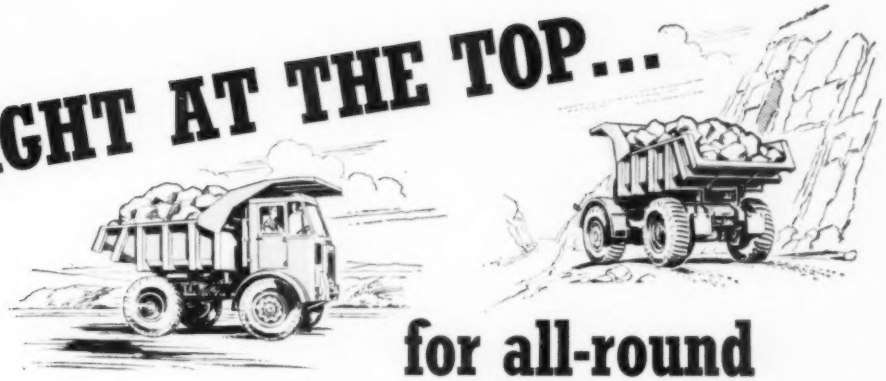
★ MASSIVE CONSTRUCTION WITH LOW MAINTENANCE COST.

★ LOW SCALE LOSS AND NEGLIGIBLE SLAG FORMATION.

114 "OFU" Soaking Pits built in the last five years — 44 in one steelworks".

G.101 GIBBONS BROTHERS LIMITED, DIBDALE, DUDLEY, WORCS. *Telephone:* DUDLEY 55141 (P.B.X.) *Grams:* "Gibbons, Dudley".

RIGHT AT THE TOP...



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The SCAMMELL Sherpa 20 Ton Gross Dump Truck is an all-purpose vehicle with 8-10 cu. yd. capacity body, invaluable alike for on-site and on-the-road use. It is designed to give dependable service under the severest conditions, whilst retaining light enough unladen weight to allow maximum legal payload on the highway.
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for SCAMMELL DUMP TRUCKS

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LO-HITE ARMOURED SNAKING CONVEYORS
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MOBILE STAGE LOADERS
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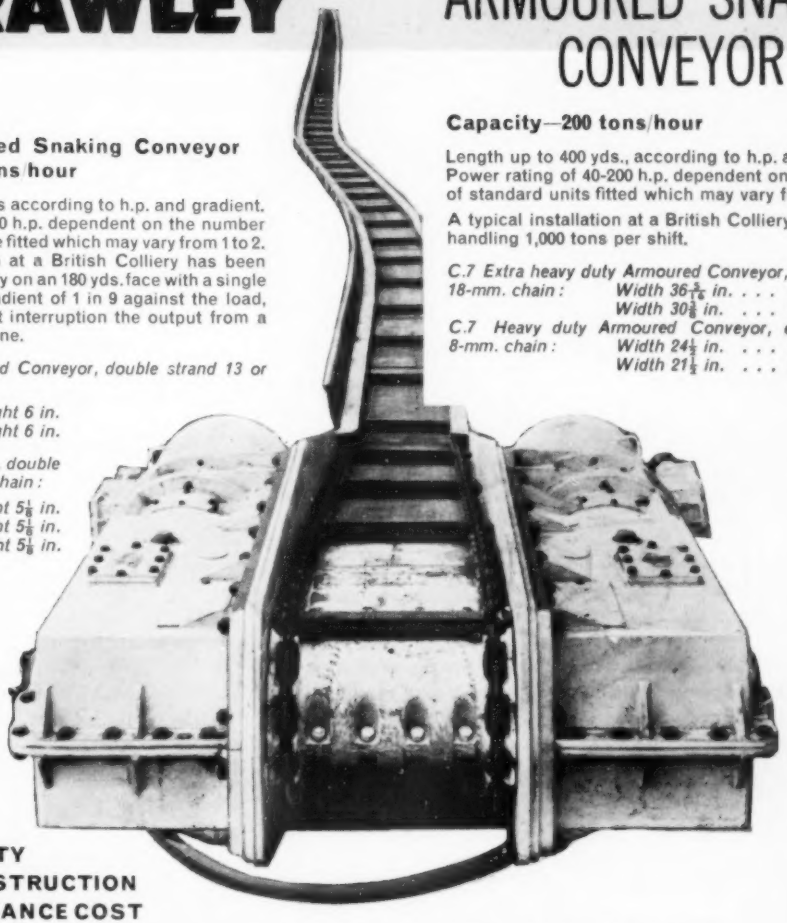
MOBILE & EXTENSIBLE STAGE
COAL BUNKER UNITS

Write for **CRAWLEY** *"Mining Equipment" Catalogue NOW!*

THE CRAWLEY

HEAVY DUTY ARMOURED SNAKING CONVEYOR



HEAVY DUTY
Lo-Hite Armoured Snaking Conveyor
Capacity—120 tons/hour

Length up to 180 yards according to h.p. and gradient. Power rating of 40-100 h.p. dependent on the number of standard units to be fitted which may vary from 1 to 2. A typical installation at a British Colliery has been operating successfully on an 180 yds. face with a single 40 h.p. unit, on a gradient of 1 in 9 against the load, and handling without interruption the output from a power-loading machine.

C.6 Lo-hite Armoured Conveyor, double strand 13 or 14 mm. chain:

Width 24½ in. . . Height 6 in.
Width 21½ in. . . Height 6 in.

C.5 Lo-hite Conveyor, double strand 13 or 14 mm. chain:

Width 24½ in. . . Height 5⅛ in.
Width 20½ in. . . Height 5⅛ in.
Width 16½ in. . . Height 5⅛ in.

Capacity—200 tons/hour

Length up to 400 yds., according to h.p. and gradient. Power rating of 40-200 h.p. dependent on the number of standard units fitted which may vary from 1 to 4.

A typical installation at a British Colliery is currently handling 1,000 tons per shift.

C.7 Extra heavy duty Armoured Conveyor, treble strand 18-mm. chain:
Width 36⅜ in. . . . Height 7⅛ in.
Width 30⅜ in. . . . Height 7⅛ in.

C.7 Heavy duty Armoured Conveyor, double-strand 8-mm. chain:
Width 24½ in. . . . Height 7⅛ in.
Width 21½ in. . . . Height 7⅛ in.

HIGH CAPACITY
RUGGED CONSTRUCTION
LOW MAINTENANCE COST

Maximum degree of snake to ensure moving over in the shortest distance, together with a high degree of lateral flexibility for undulating gradients. Alloy steel sprockets, giving long trouble free service. Various types of spill plates available to suit operating conditions. Special patented sectionalised pans for insertion at intervals in the conveyor run enable the pan line to be broken for inspection without breaking either top or bottom chain. Chain speed from 114 ft. to 185 ft. per minute to suit individual conditions. All types of conveyors can, at request, be supplied with N.C.B. recommended drive frame and gear boxes.

All Crawley Heavy Duty Machines have the following units standard and interchangeable:

DRIVE FRAME • GEAR BOX • GEAR ASSEMBLIES
EXTENSION SECTIONS • STRUCTURE • TAIL UNIT
CHAIN FLIGHTS

AYLING INDUSTRIES GROUP

CRAWLEY

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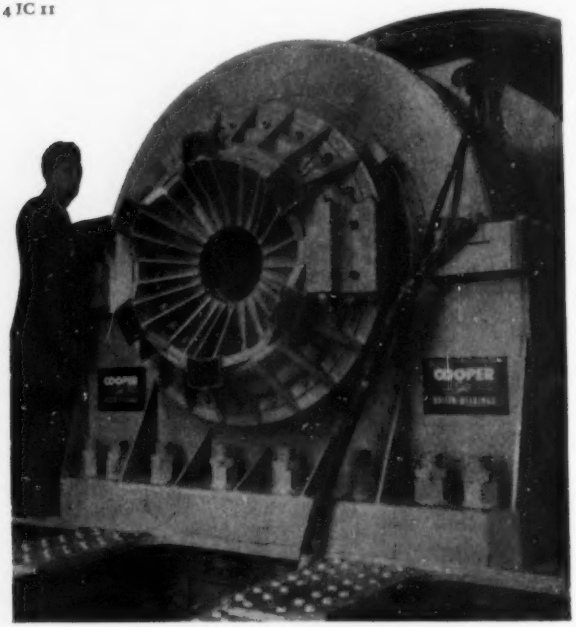
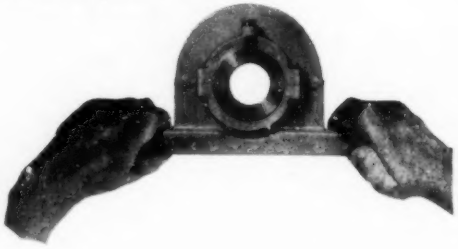


a very important Cooper...

This Cooper Split Bearing is one of two supporting the 250 ft. diameter Paraboloidal Reflector on the gigantic Radio Telescope at Jodrell Bank. Each Cooper is 30" bore and is designed to carry a radial load of 500 tons and a thrust load of 125 tons. Their design is to the same principle as our standard range of Split Bearings which have been manufactured for over 50 years. Some 40 Pedestals in sizes from 4½" bore to 10" bore are used for the Bogie drives and Reflector actuation. Whatever the size of the equipment you are dealing with, Cooper Split Roller Bearings offer **great** advantages. The fact that they are split right down to the shaft frees the designer (no worry about 'how to get the bearings in')—and guarantees simple maintenance.

...another very important Cooper...

The smallest Cooper is 1 3/16" bore. Whilst perhaps having a less spectacular role than those on the Radio Telescope, it can be depended upon to give long years of trouble-free service. Cooper Bearings are made in three standard series—Medium, Heavy and Extra Heavy—and all sizes are complete with self-aligning Housings and Pedestals. Perhaps we should add that prices are competitive, deliveries prompt. May we send you a Catalogue giving full technical details?



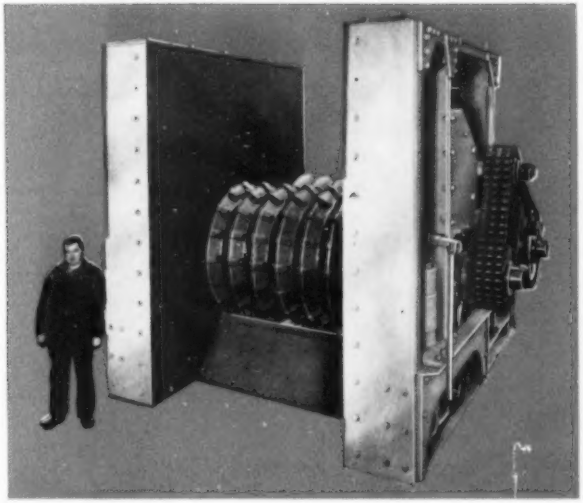
COOPER ROLLER BEARINGS

split right down to the shaft

REGISTERED TRADE MARK

COOPER ROLLER BEARINGS CO. LTD., KING'S LYNN, NORFOLK, ENGLAND · TELEPHONE: KING'S LYNN 3447

SCREENING

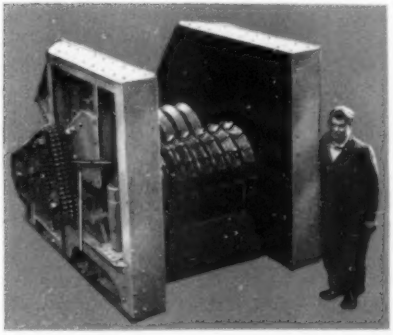


(*Right*) Size No. 10 Ross Patent Two-Roll Grizzly scalping limestone ahead of a 54" Gyratory Crusher. Note aperture adjusting lever on right hand side.

(*Below*) Size No. 6 Ross Patent Two-Roll Grizzly extracting –5" material from run-of-mine pit dirt.

ROSS MATERIAL HANDLING EQUIPMENT

FOR THE IRON AND STEEL, QUARRYING & MINING INDUSTRIES



ROSS PATENT TWO-ROLL GRIZZLY separates material with extraordinary rapidity and completeness. It is characterised by its robustness and it can take a feed of the largest and heaviest run-of-mine material, but of even greater importance is its ability to screen sticky material—in fact the stickier the feed the greater the efficiency.

Wide ranges of machines and apertures are available, the latter being instantly-adjustable while machine is operating.

ROSS

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CANADIAN LICENCEES: DORR-OLIVER-LONG LTD., ORILLIA

MTR-1

ROBERTSON

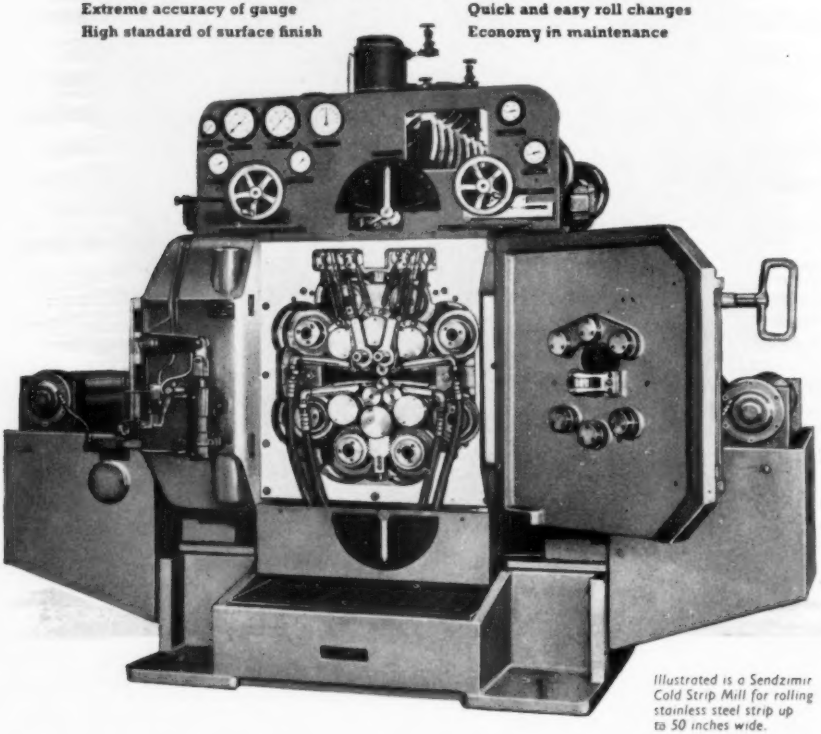
SENDZIMIR Cold Strip Mills

For rolling all types of ferrous and non-ferrous metals up to 120 inches wide

Sendzimir Mills are built under licence by Robertsons.
They have constructed all types of these mills (Strip Mills, Sheet Mills and Planetary Hot Mills) and have the specialist knowledge and skill so essential for the accurate machining to the very closest tolerances demanded in their manufacture.

The main advantages of Sendzimir Cold Strip Mills are as follows—

Large reduction at each pass
Freedom from strip crown and edge cracking
Extreme accuracy of gauge
High standard of surface finish
Small work rolls render use of tungsten carbide rolls economical
Quick and easy roll changes
Economy in maintenance



Illustrated is a Sendzimir Cold Strip Mill for rolling stainless steel strip up to 50 inches wide.

W. H. A. ROBERTSON & CO. LTD · BEDFORD · ENGLAND

LICENSEES FOR THE BUILDING OF SENDZIMIR COLD REDUCTION MILLS AND PLANETARY HOT MILLS. HALLDEN GUILLOTINE AND ROTARY FLYING SHEAR MACHINES AND THE TORRINGTON METAL WORKING MACHINERY

WT. 331 R

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MM

Fully mechanical

ANCHORING
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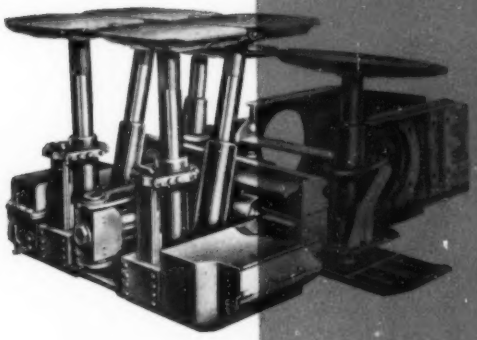
TENSIONING



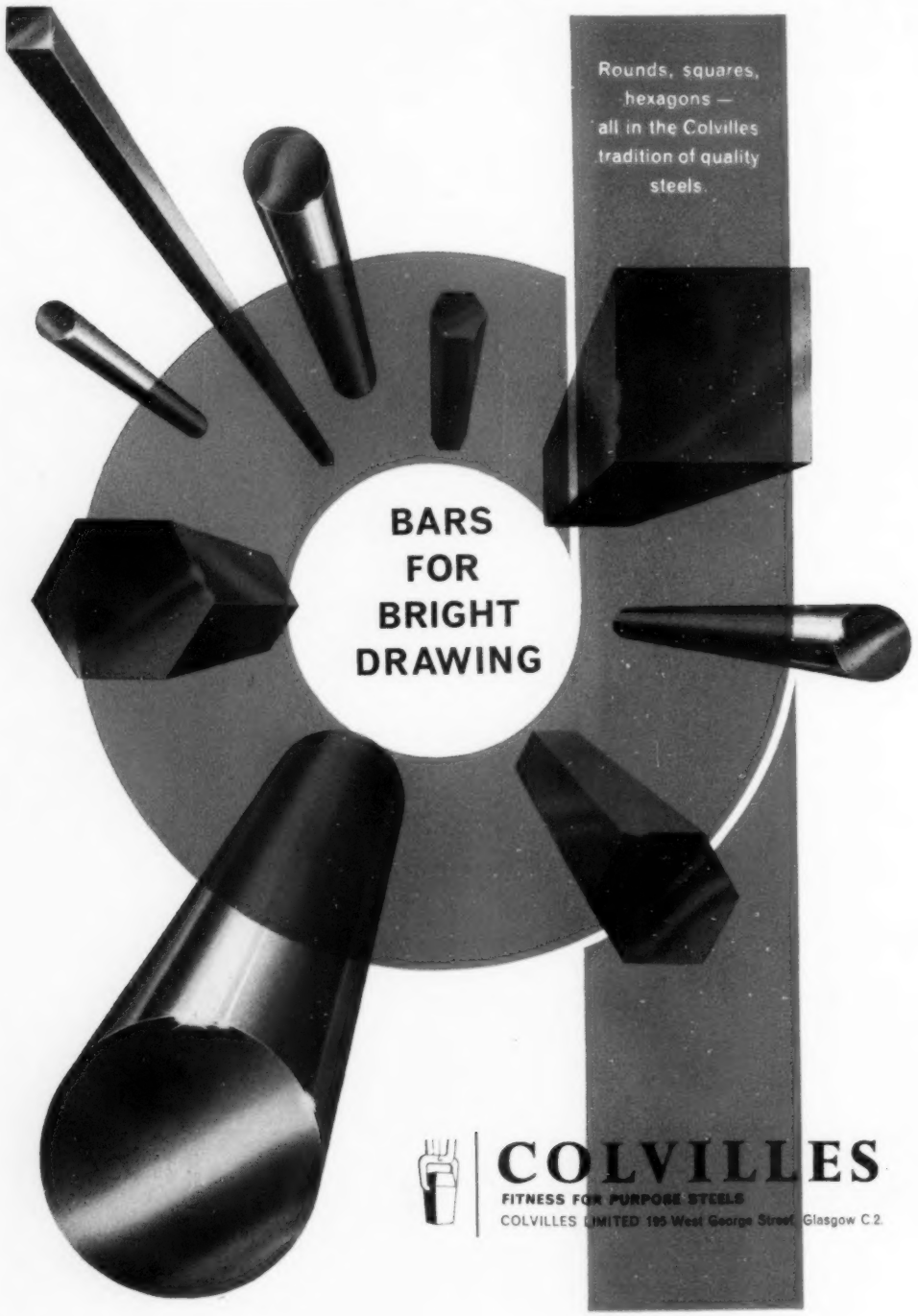
of Ploughs and PANZER*) Conveyors by means of the **self-advancing hydraulic anchorage** for tail end drives

*) R.T.M.

- Compact design requires only small stable
- No additional roof support required with the anchorage
- High bearing load of all the six props
- Correct sequence of operation ensured by use of special valves
- Time taken to advance tail end only three to four minutes.

UNDERGROUND MINING MACHINERY LTD.

Agents: **Dollery & Palmer Ltd.,**
54, Victoria Street, London, S. W. 1, and Lydgate Lane, Sheffield, 10


Rounds, squares, hexagons — all in the Colvilles tradition of quality steels.
BARS FOR BRIGHT DRAWING
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FITNESS FOR PURPOSE STEELS
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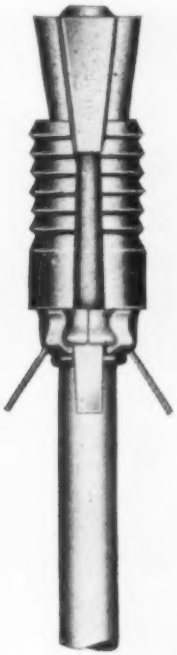

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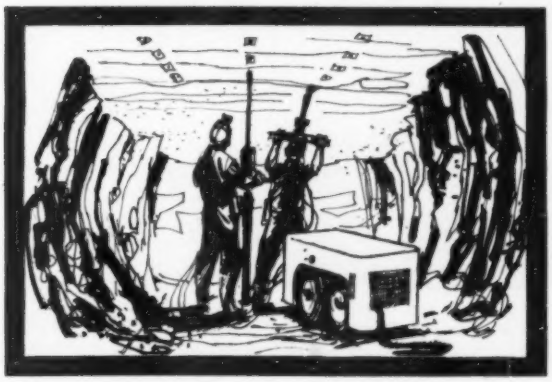

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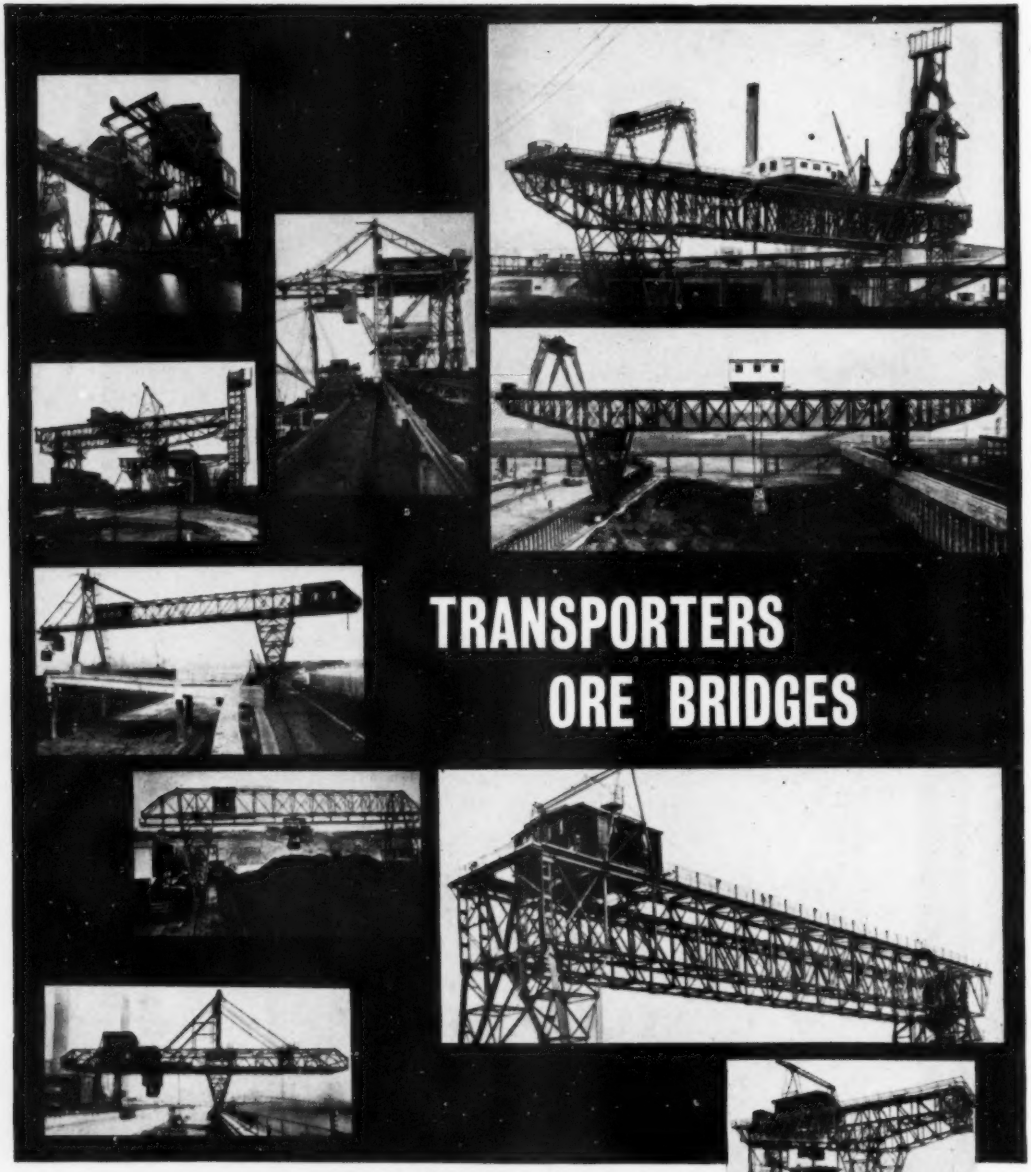

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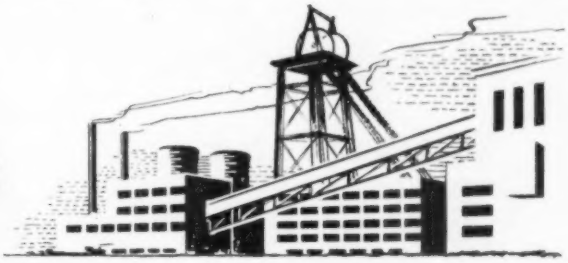

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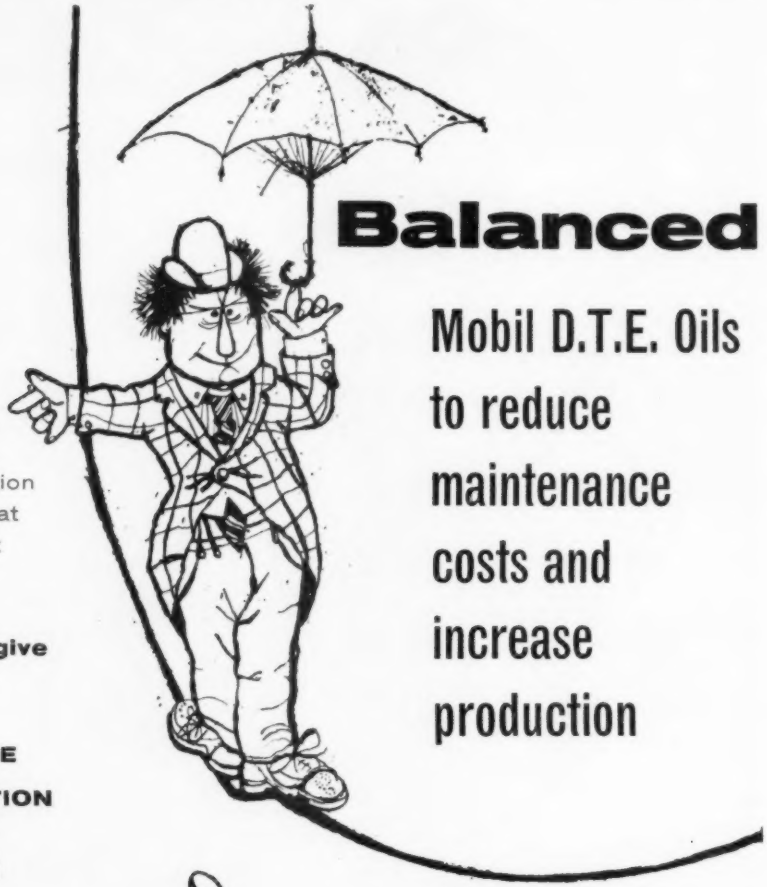

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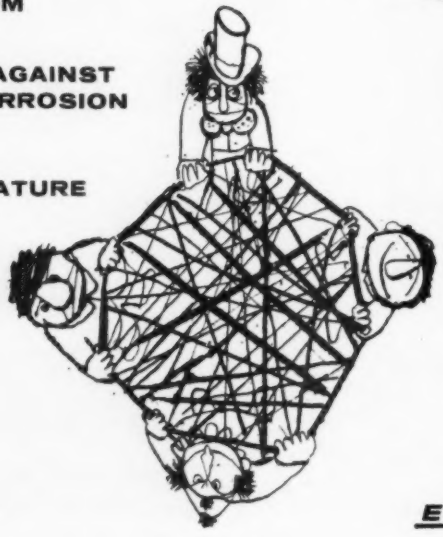

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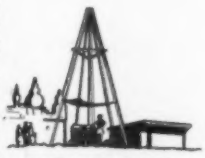

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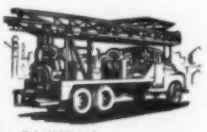

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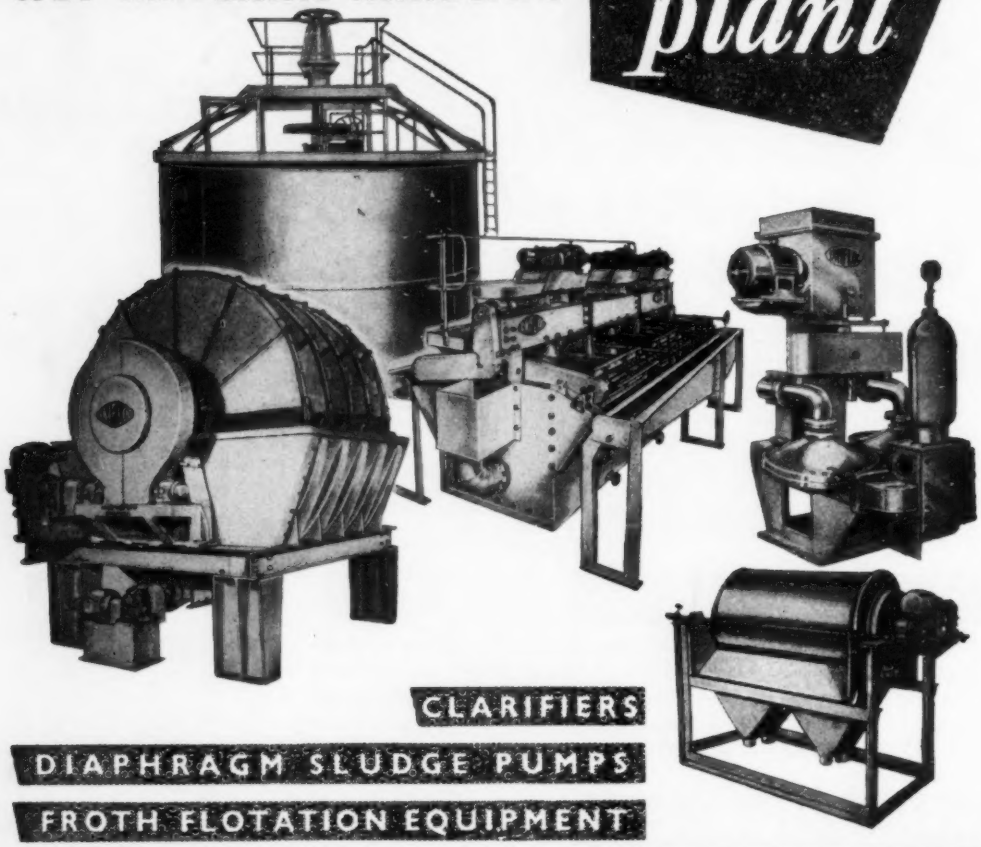

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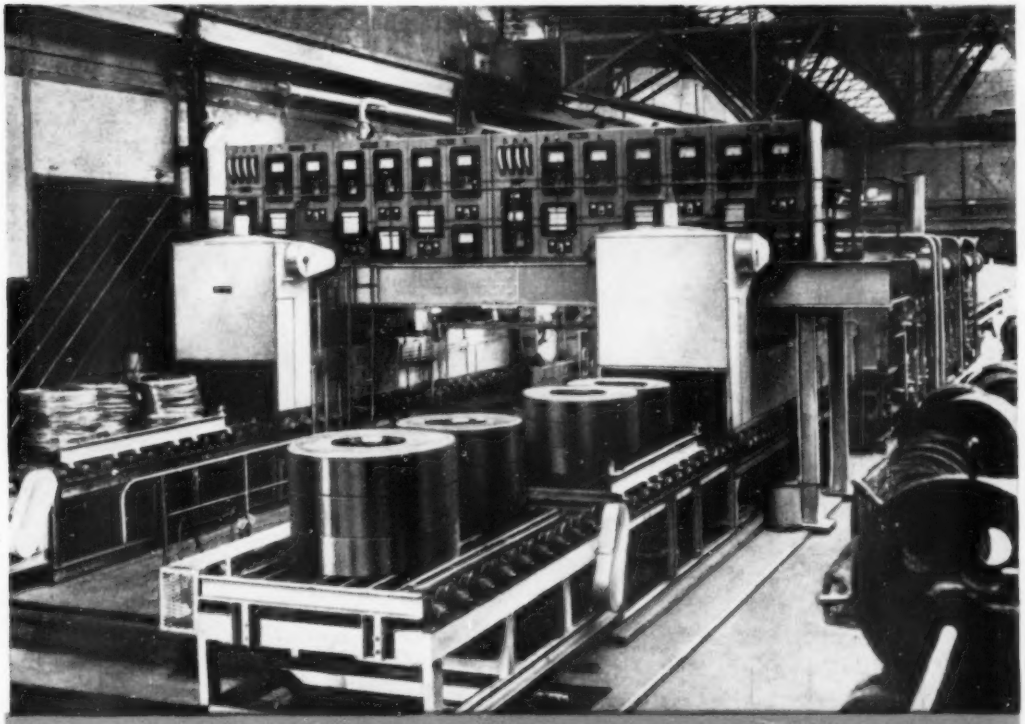

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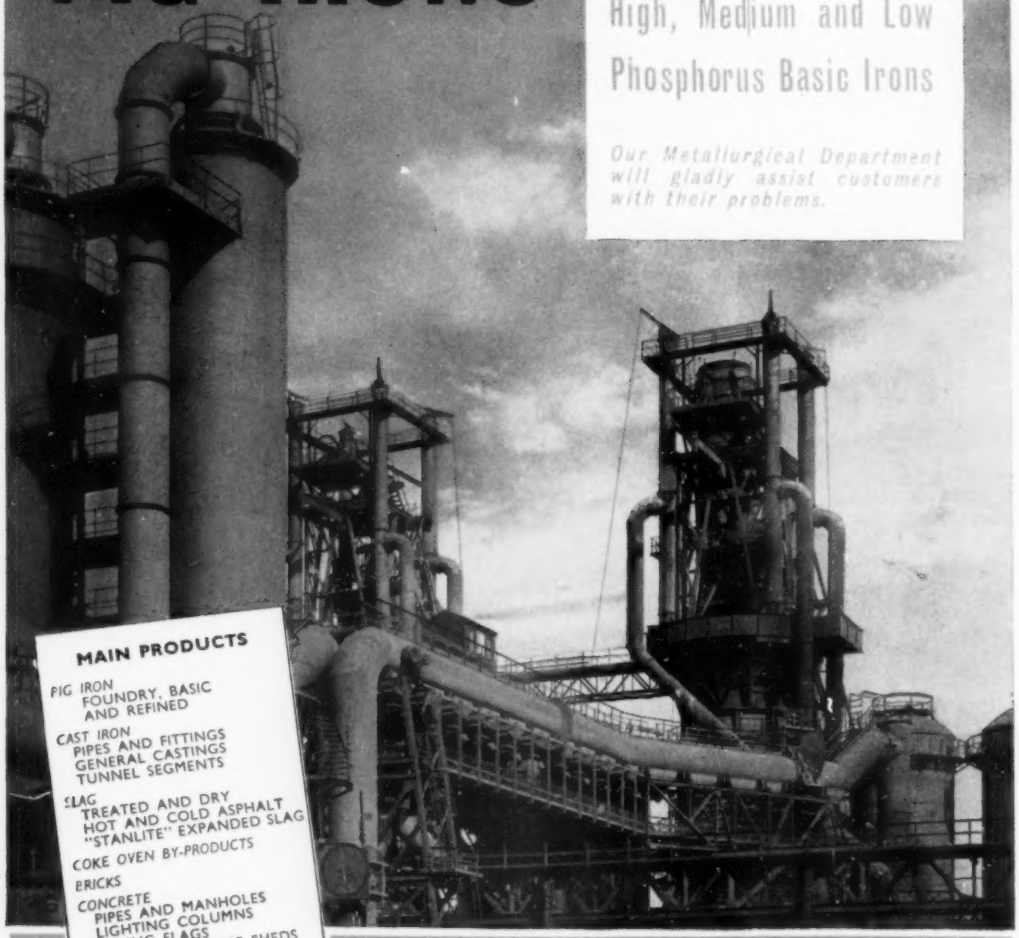

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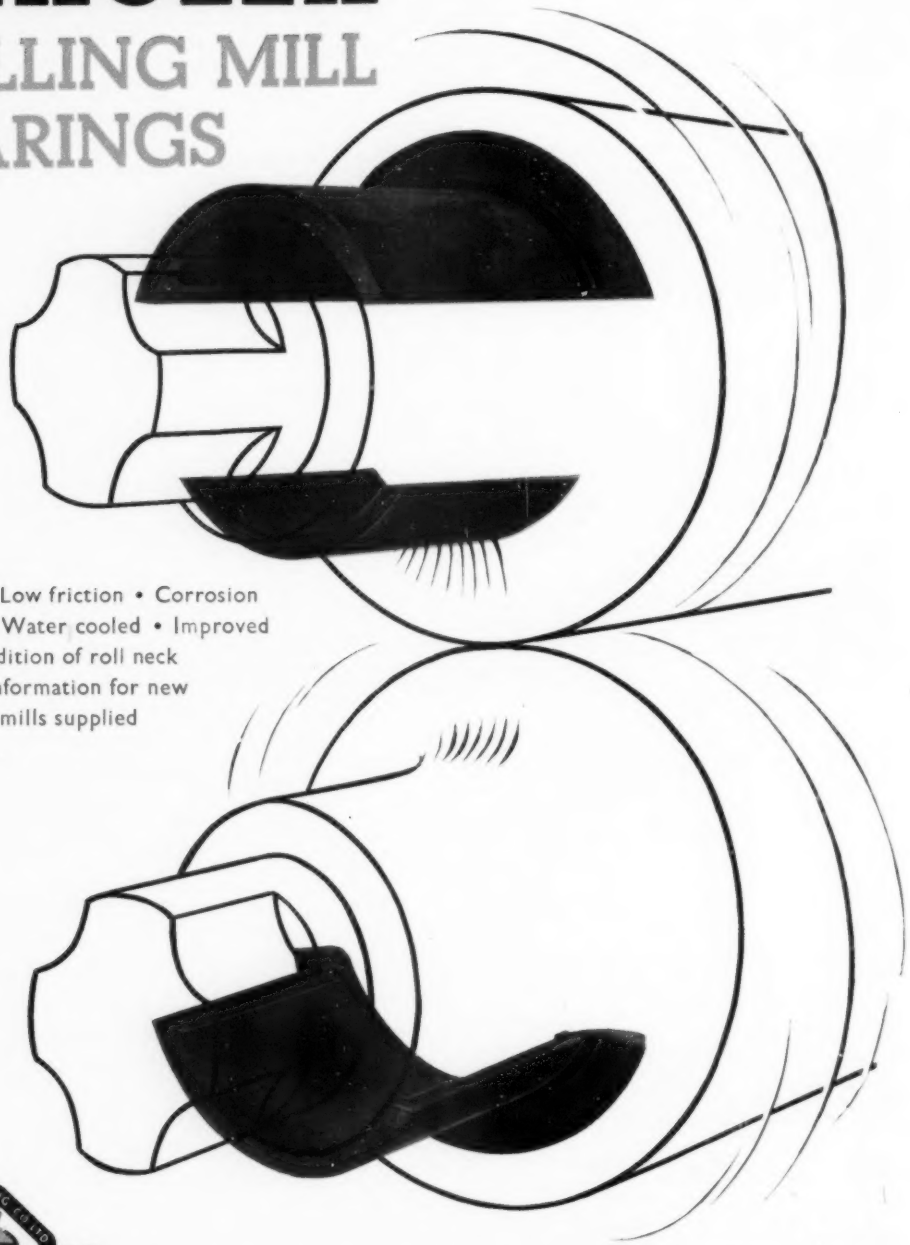

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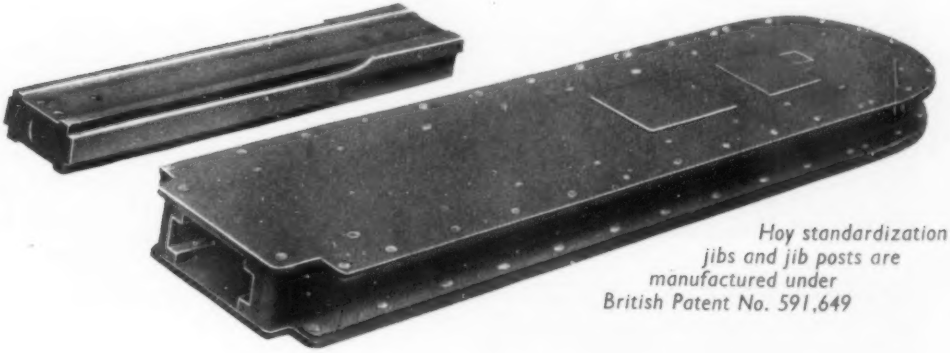

Hoy standardization jibs and jib posts are manufactured under British Patent No. 591,649

The illustration shows how a standard maker's jib post is rebated to provide a sliding fit in the machined channel-section beam of the jib. This ensures that the weight of the jib is borne on the strongest part of the jib—the jib beams—and not on the jib plate as in conventional designs.

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3

An 1859 achievement

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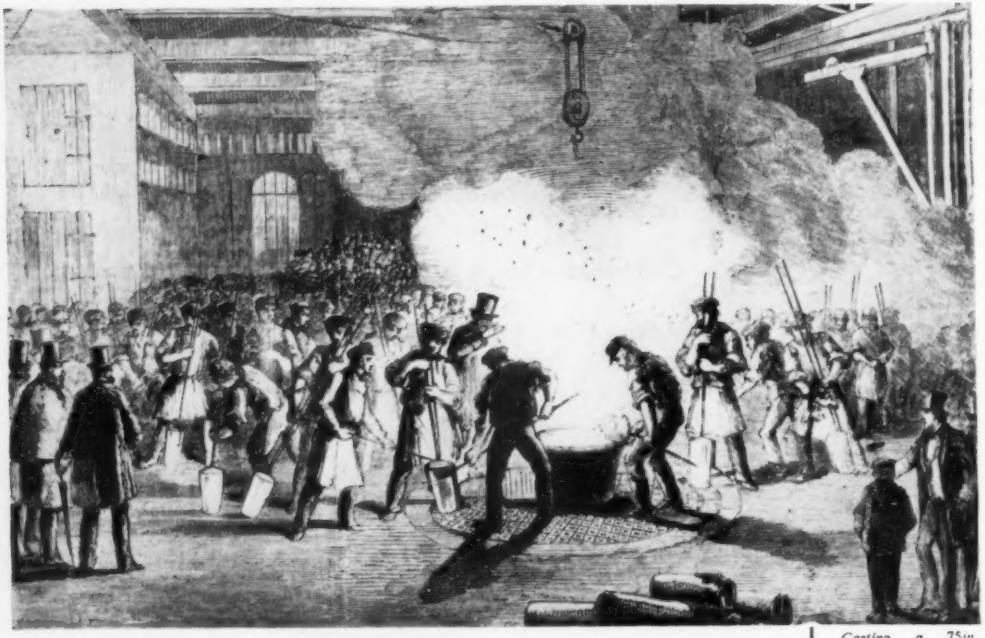
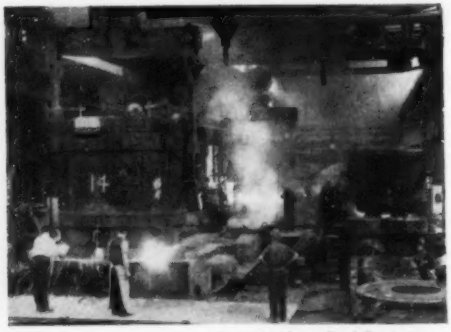


Casting a 75in. diameter Bell for San Francisco in 1859.



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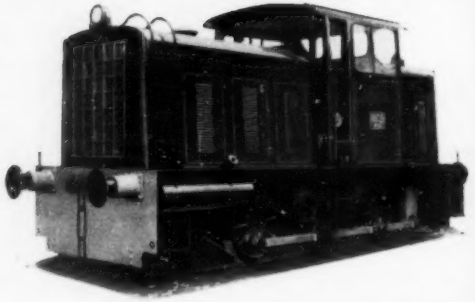

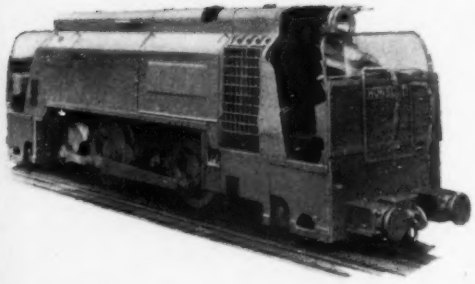

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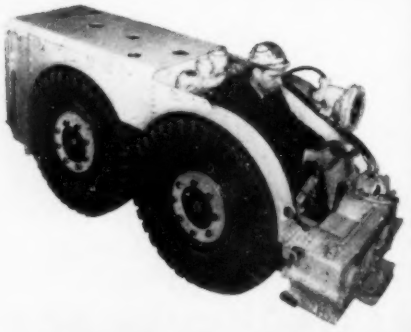
MINES TRACTORS



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Rolling Mill Equipment

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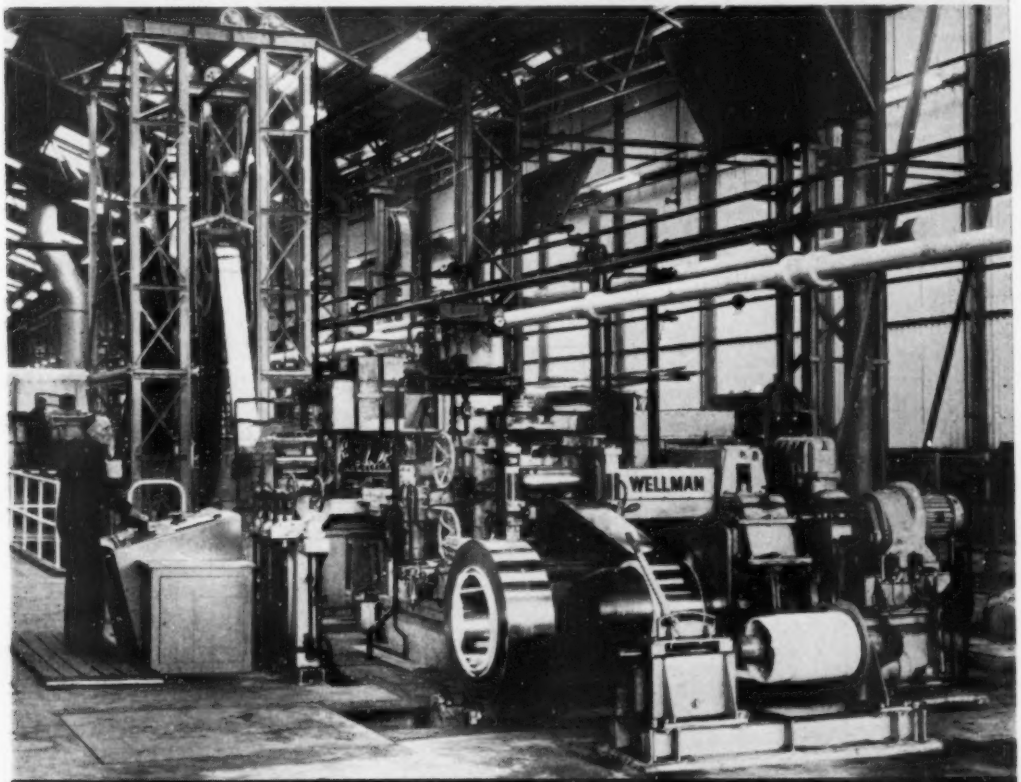

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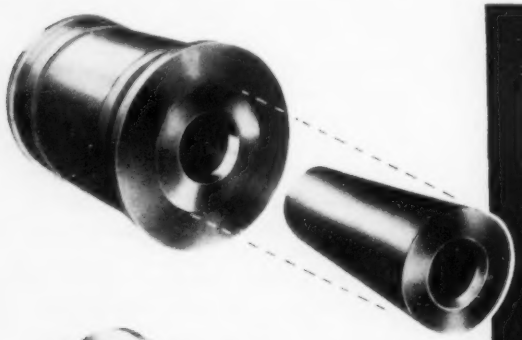

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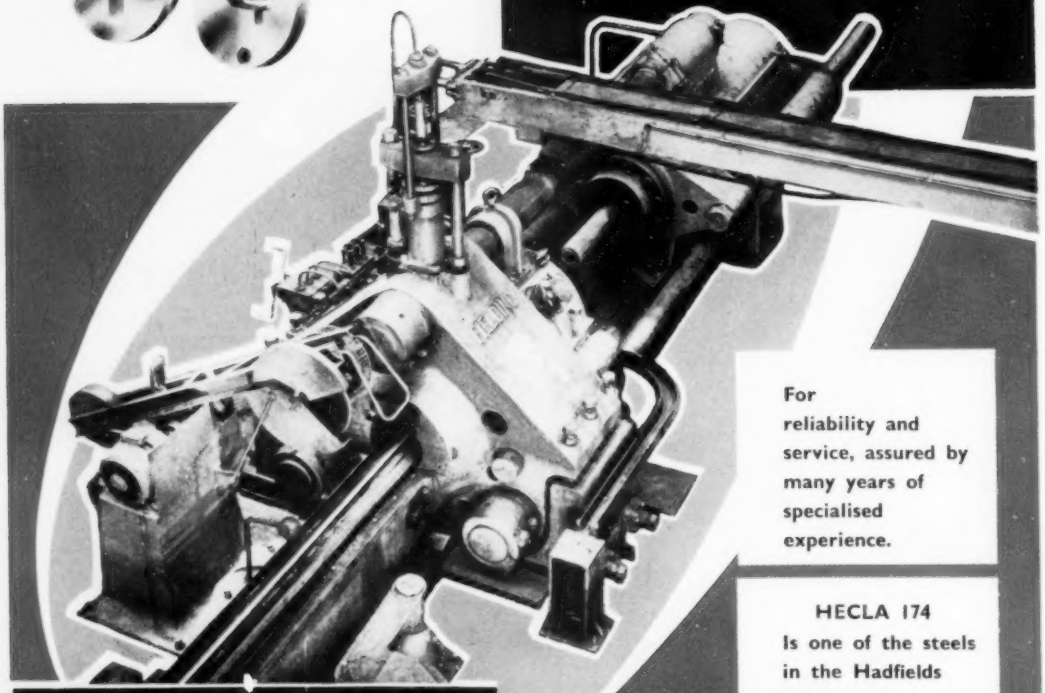

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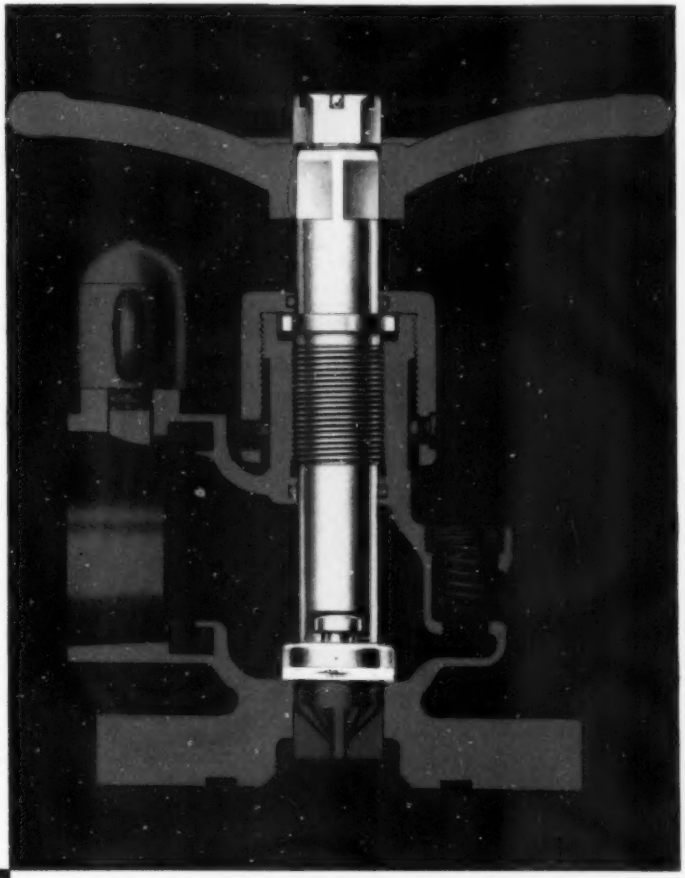

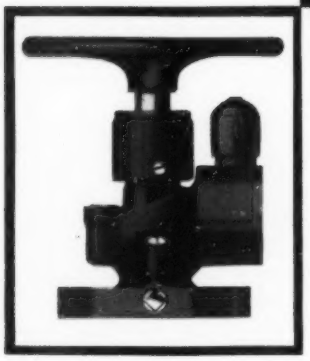

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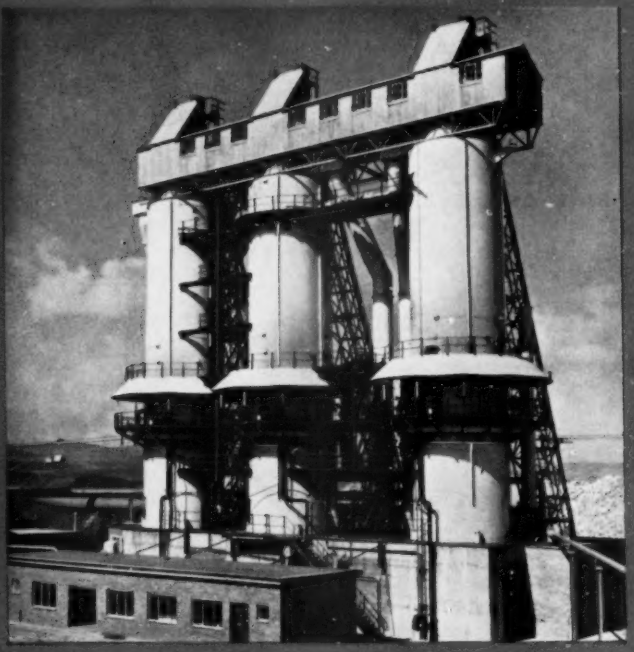

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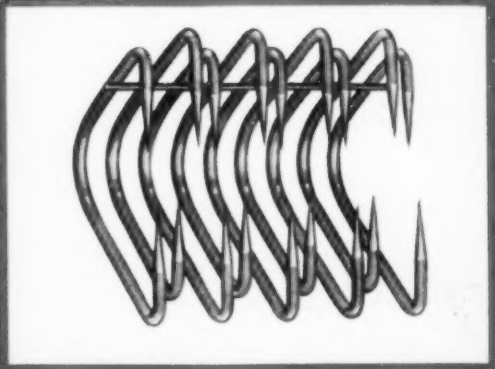

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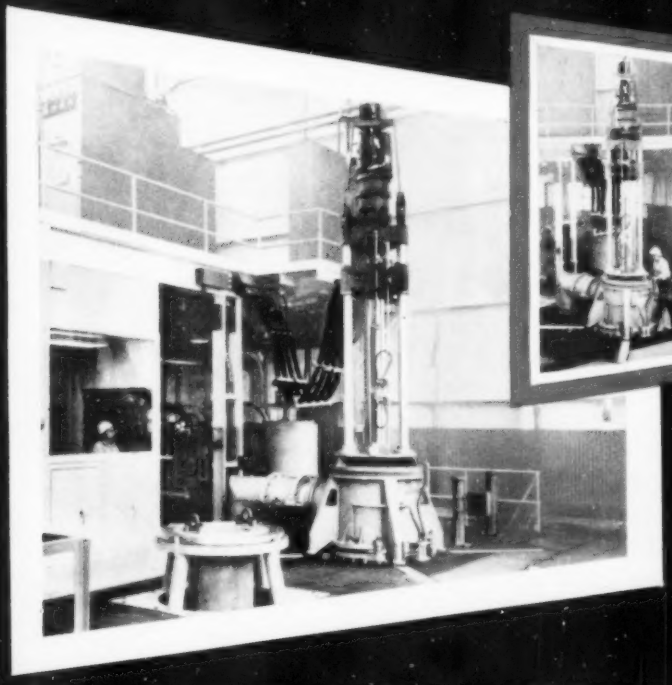

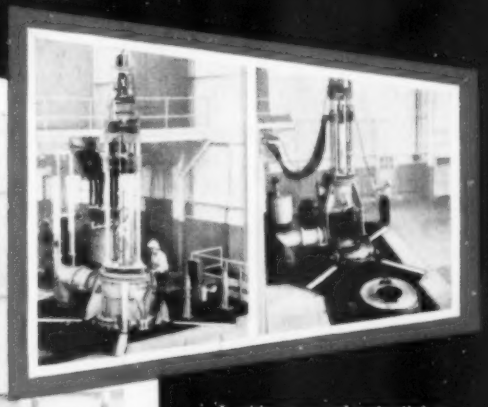

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" No. 14	Dry	Hydraulic	1500°C	1200°C	1450°C	2⅛	1⅛	120
" No. 16	Dry	Hydraulic	+1750°C	1200°C	1600°C	1⅜	1	160
" No. 17	Dry	Hydraulic	+1750°C	1200°C	1700°C	1½	1	160
" No. 18	Dry	Hydraulic	+1750°C	1200°C	1800°C	1½	⅛	160
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No. 4847

IRON & COAL

THE IRON AND COAL TRADES' REVIEW

JUNE 9,
1961

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AP91

IRON & COAL
THE IRON AND COAL TRADES REVIEW

Vol. 182 June 9, 1961 No. 4,847

Progress with Safety

ALREADY this year special efforts have been made in many parts of the world to arouse a much greater general interest in campaigns for the prevention of accidents. According to the World Health Organization, so far as loss of life is concerned, accidents not only cause more deaths annually than do infectious diseases: they are also responsible for more deaths than any single illness except cancer and cardio-vascular disease. Indeed, so appalled has WHO been by the toll of death and injury from accidents that it made accident prevention the theme for this year's World Health Day—a day intended to give every one of us an opportunity to reflect on the dismal record of accidents as well as to decide to do something about it.

True, the vast majority of the accidents included in the WHO survey occur outside industry, but industry nevertheless claims quite a heavy toll. To the total of industrial accidents in this country, coal-mining contributes more than any other industry. This, of course, is understandable, for it is the major extractive industry in which coal is won underground in places where daylight never enters, where supervision is far from easy, where the working place moves as extraction proceeds, and where efforts to maintain a safe environment, both in respect of the conditions of the roof, floor, and sides of the place of work as well as of its prevailing atmosphere, must be keen and continuous.

Quite apart from his personal interest in accident prevention and his desire that the National Association of Colliery Managers should discuss the disappointingly small decline in the coal-mining accident rate during the past few years, it was most appropriate that Mr. Harry Wilson, the president, should select "Progress—with Safety" as the theme of this year's conference at Edinburgh, and that the council of the association should welcome his choice wholeheartedly. The lively discussion of the excellent papers presented to the conference made it crystal clear that the choice also had the warm approval of the members.

No one, we suggest, will deny that great progress, technologically, has been made over the years—and more especially during recent years—to improve working conditions and to raise the standards of safety generally in mines through the use of better methods and machines, better planning and lay-out, better installation and maintenance of equipment. But it is clear from the accident figures of the past few years that, despite all that has been done in these directions, technical progress has not automatically brought with it a marked reduction in the accident rate. There can be little doubt that the improvement in the accident figures is much less than most mining men would have expected from the vast amount of new work, reconstruction, and modernization that has been accomplished in recent years. And this, it would seem, is not due to the introduction of new or unknown hazards arising from these technological advances, even although it has come to light that all the risk factors in some previously known hazards had not hitherto been fully appreciated.

Nor, we think, would anyone suggest that the industry is under-regulated or under-inspected; that schemes for education and training within the industry are inadequate; that there is a lack of properly qualified technical specialists; that there is insufficient scientific research into mining dangers; that there is not enough joint consultation within the industry on matters relating to safety; nor, indeed, that there is a whole lot of people in the industry not in favour of safety.

Once upon a time it might have been suggested in some quarters that the parsimony of the owners created an insuperable barrier to the provision of conditions that made for a marked improvement in accident rates. But such times, if they ever existed, have long since gone. Today, as will be gathered from the worthy contributions made to the conference by the authors of papers and by those who took part in the discussion of them, there would seem to be no shadow of doubt that the facilities and resources necessary to bring about and maintain a significant improvement in the accident rate are available within the industry. How, then, are we to account for the present lack of success in achieving a higher rate of decline in the accident rate? The indications are that somehow or other there has been a failure lack of success in achieving a higher rate of enthusiasm, to use in the most effective and efficient way the resources that lie to our hands, and that somehow the cause of this failure is related more to people than to things.

From the very nature of mining operations, it soon becomes evident in any campaign to prevent accidents in a coal mine, that people—their attitudes and behaviour—at once assume very great importance. Indeed, there can be no doubt that in trying to make all employed in mines more safety-minded, more interested in doing something positive to prevent accidents, lies one of the most

difficult and persistent problems of the industry. "Be sure and study the great diversity of human nature," said the philosopher Kant in another context. It is wise counsel now, we suggest, in our present context. The varieties of individual man are without end—the hot headed and the cool headed, the skilled and the clumsy, the dreamer and the bustler, the co-operator and the unco-operator, as well as the wide range of intermediate types between these extremes. All make for difficulty because, varying as they do in their talents, responses, and behaviour, they display every type of unpredictable reaction.

While the papers and the discussion of them at Edinburgh showed general agreement that everything must continue to be done to make the environmental conditions in mines as safe as they can be made by the application of good engineering and mining practice, managers were left in no doubt that something more was needed. Far greater emphasis will have to be given in future to the human factor if any significant measure of success is ever to be attained in the work of accident prevention. Something more than is now being done at most collieries, possibly on the lines of the campaign for greater safety described in the paper by Dr. Reid, is needed at every colliery to excite and maintain a much greater individual interest in safety matters than is now evident.

Taking the industry as a whole, it is probably true to say that there is a general awareness about accidents and the need to prevent them. But this alone is not enough. To be effective this general awareness must find local expression. The generality of mining men get their awareness of accidents from a knowledge of the totality of accidents in the industry. But the individual miner who only at rare intervals is directly associated with an accident develops a complacency—a barrier of indifference—to accidents which expresses itself in the common notion that accidents happen to someone else! May it not be that what is most required at each mine is someone of the right calibre who can pierce this barrier of indifference and convert the general awareness into an individual appreciation?

It cannot be gainsaid that over the years there has been great progress in the direction of greater safety in the mines of this country. In this respect, British mines compare favourably with the mines of other countries. At a time when so much emphasis is being laid on the need to increase productivity and reduce costs, the NACM is to be congratulated that it should once again be stressing the vital importance of safety.

FOR THE PAST six years safety officer at Cleworth Hall Colliery, Tyldesley (Lancs), Mr. T. Raftery has retired.

Aerial Ropeway System for Transporting Miners

MINERS at a Nottingham colliery may soon be using a unique form of mine transport—a "ski lift" which will carry them up steep slopes nearly a quarter of a mile below ground. The system, already installed at Clifton Colliery, was the idea of Mr. Harold Horrocks (54), a method study engineer in No. 6 (Nottingham) Area of the East Midlands Divisional Coal Board. His prototype aerial ropeway is undergoing extensive trials and has already carried men on the 370-yd. journey between its terminal points.

Miners, who have nicknamed the ropeway the "ski lift" because of the steep gradients it climbs, will not be allowed to use it until the trials have been successfully completed. It negotiates gradients of 1 in 2, 1 in 5, and 1 in 15, travelling from a terminal in the shaft bottom, and passengers are carried in special "chairs" attached to the $\frac{1}{2}$ in. dia. wire rope by patent clips. The rope itself, powered by an electric motor, runs on pulleys attached to steel roadway

arches. At present only five chairs are in use, but the system is designed to carry men at 10-yd. intervals, at speeds of up to 4 m.p.h. A signal wire is near to hand along the full length of the ropeway.

A similar installation is also being tried out on a 500-yd. stretch of easier roadway at Wollaton Colliery, Nottingham. Its advantages over conventional methods of carrying men underground are that it can be used on very steep gradients where other forms of transport are impracticable, and it saves time in that miners do not have to wait until an underground train is filled before moving off to the coal face or other place of work.

From the safety aspect, the system has an advantage over train transport in that men are not concentrated in one place in the event of a mishap, and on the Clifton ropeway passengers' feet are never more than 18 in. from the ground.

"10-YEAR JOB"

To Clear Coal Board Deficit

HOPE that the National Coal Board's £20,000,000 deficit would be halved this year and that the board would be able to "move into the clear" in 1962 was expressed by Mr. Alfred Robens, the NCB chairman, at a Press conference held in connection with the publication of the board's annual report and accounts last Friday. The accumulated deficit could, of course, only be cleared over the years. "My own opinion, for what it is worth, is that it will be a 10-year job," he added. He hoped more divisions would be working on a profit basis by 1962, but he did not believe that Scotland could pay its way. It was a passenger that had to be carried all the time.

Manpower was the subject of a number of questions at the conference. Mr. Robens said that getting men to work in the pits was going to be a much more difficult task than ever before, and they must therefore concentrate on machines which could be operated with the minimum of manpower.

He referred specifically to the Midget Miner, now in operation at New Lount Colliery. The "manless" coal face would not be achieved for very many years, but it was significant that work in that direction had been started.

Manpower Wastage

On wastage, Mr. Robens said there were two main reasons for people leaving the coal-mining industry. The board was very concerned about wastage and was carrying out a survey to establish, as far as possible, the motives prompting employees to seek work in other fields. Very often those getting good money—between £20 and £30 a week—were leaving the industry for jobs less remunerative. This applied especially to men between 30 and 40 years of age, most of whom were married. Mining was a 24-hour-a-day job, and it was found that many of those who left did so to get work that enabled them to enjoy a somewhat fuller social life.

The other main wastage factor was the high rate of loss of apprentices to the industry. It cost between £400 and £500 to train a youngster, said Mr. Robens. "When they are 21 along comes a private employer who has spent no money at all on training and offers £2 a week more than we can afford to pay and away they go.

"These employers can easily afford to pay the higher wage and still show a profit. I don't want to enter the political arena, but until somebody compels all those who want to use craftsmen to make some contribution in one form or another to training, big industries who are paying heavily to train men will continue to lose their labour."

He indicated that the board did not intend to be caught again with a stockpile large enough to embarrass it. He believed that all industries ought to carry reasonable stocks of coal for their needs "on their own backs" and to lessen the costly strain on the railways during the peak period of the winter months, the board was offering commercial incentives to the larger consumers who were willing to stock up during the summer.

The Coal Board's annual report and accounts are summarized on page 1241.

Evictions from NCB Houses: Mr. Robens Answers MP

CHAIRMAN of the National Coal Board, Mr. Alfred Robens, has told Mr. Stephen Swingler, MP for Newcastle-under-Lyme (Staffs), that the board "cannot afford" to let ex-miners stay in NCB houses in the area because they are needed for incoming workers. Mr. Robens' view is expressed in a letter to Mr. Swingler following protests from Newcastle Town Council that evictions may disrupt its own housing plan. By agreement, tenants leaving NCB houses are given priority on the council housing lists.

Mr. Robens says that 38 tenants of houses in Newcastle have left the industry. Action to obtain possession of their houses has been started against 15, the other 32 cases are being examined. While assuring Mr. Swingler that personal circumstances are taken into account, he adds that the houses were provided for "working miners," and "in the Newcastle area we badly need houses to help the re-deployment of trained miners from the declining to the developing coalfields." The board must try to ensure that the best possible use is made of the available houses, he states. Mr. Robens expresses appreciation of the help of the local authorities, and says that the NCB consults them as soon as possible when seeking possession of a board-owned house.

Mr. Swingler is suggesting a local conference of NCB and council representatives to discuss the problem.

Army Moves NCB Tunnelling Machine

BECAUSE the National Coal Board could not find a firm of contractors to do the job, Territorials using steel ropes and two Centurion tanks converted for tank recovery, last weekend helped to move a 300-ton tunnelling machine into position on a quarry face where it is to be tested.

The machine has been developed at the NCB's Central Research Establishment at Bretby (Staffs) and has been designed to bore 18-ft. diameter circular roadways in the underground workings of coal mines. It is possible that it could be applied to the sinking of vertical shafts.

BECAUSE WORKABLE reserves of coal are exhausted, Stanley Colliery, West Hallam (Derbyshire) is to close on July 7. All the 230 workers at the pit have been guaranteed alternative employment.

Passing Thoughts . . .

IF I were to walk along Victoria Street and pinch some articles made up as a shirt, or socks, or some garment without paying for them, I would be apprehended and prosecuted—quite properly. Yet apparently an "industrial cuckoo" can pinch a skilled man without any penalty, although that man has been trained by another company at a cost of £1,000, and has spent five, or six, or seven years of training to gain his accumulated knowledge and skill . . . . I am genuinely bewildered as to why the Government allows such a state of affairs to continue.—MR. DAN JONES, Labour MP for Burnley.

The day is practically gone when the skilled craftsman can spend the whole of his working life after apprenticeship making much the same things in much the same way.—MR. ANTHONY BARBER, *Economic Secretary to the Treasury.*

A country which has grown rich and powerful as a result of the initiative and foresight of its manufacturers and merchants, and the skill and ability of its workpeople, has reached the point where the Government has to try and stir up an effort to withstand foreign competition. This is a pretty gloomy situation. —THE DUKE OF EDINBURGH.

While plainly we in Britain must make better use of run-of-the-mill abilities and natural aptitudes than in the past, it is foolish to talk as though all can be technicians or new-age craftsmen.—The Journal, Newcastle-upon-Tyne.

The Government has to look both ways at once. It has to remember that coal is the most generous natural asset that Britain has; that its strategic importance is immense; that it forms a livelihood for nearly 600,000 who are among the most politically conscious in the country. It would be too easy to say prices should find their own level; if they did the effects might be catastrophic.—Sheffield Telegraph.

Rapid modernization and the incorporation of new techniques of craftsmanship may make an appeal to the miners. . . . But more must be done to rid the coalfields of their dreariness.—Yorkshire Post.

The [National Coal] Board is using public money, and, although there are various ways of looking at its accounts, its accumulated deficit, now some £77,700,000, is a large loss to be made good. . . . What is disquieting is the board's assumption that all will be well in the end if its present policies are continued.—The Guardian.

Mr. Robens has arrived at a favourable turn of events, but the new broom is clearly not going to sweep the political cobwebs away.—Daily Telegraph.

The future of coal will largely be determined by the mineworkers themselves. If they show little regard to the national interest they cannot expect much public support for their demand for a national fuel policy which may prove to be only a pseudonym for protection for coal.—The Scotsman.

Mechanization can become the handmaid of advancing general conditions, wages, and security, and if it does not, I do not want anything to do with it.—MR. W. H. SALES, *chairman of the North-Eastern Divisional Coal Board.*

To Co-ordinate Research Activities at SCOW

TO implement unification of the company's research activities, the Steel Company of Wales, Limited, has appointed Dr. C. S. Ball, superintendent of research, Steel Division, to be research controller of the company.

DR. C. S. BALL

Dr. Ball will have the duty of developing and increasing the scope of the company's research facilities, previously organized on a divisional basis, including co-ordination and where appropriate unification of present organizations. To this end, the company intends to start immediately on the construction of research laboratories at Port Talbot (Mon), where concentration of iron and steel making facilities in one comprehensive site will combine the advantages of centralized research with day-to-day contact with plant operations.

After graduating from the Faculty of Metallurgy at Sheffield University in 1942, Dr. Ball joined K. & L. Steelfounders & Engineers, Limited, as an assistant metallurgist and remained there until 1945. After a further period at Sheffield University as a post-graduate student and Research Fellow, he was in 1950 appointed Lecturer in the Department of Industrial Metallurgy at Birmingham University. In 1954 he was appointed assistant chief metallurgist to the Steel Division of SCOW, and in 1957 chief metallurgist. He became superintendent of research, Steel Division, in July, 1960.

First Two for YZ Club

THIRD club for those who can attribute soundness in limb if not wind to wearing safety clothing has enrolled its first two members. The first two clubs enrolled those who had escaped eye and feet injury—the Golden Eye and the Golden Shoe clubs. Now comes the YZ Club.

The club's sponsors—the Royal Society for the Prevention of Accidents—announces that the first two to carry YZs on their shoulders are Mr. D. C. Hicks, a process operator with British Titan Products Company, Limited, and Mr. R. W. Harrison, a tackleman for Dorman Long (Steel), Limited. Both were wearing safety helmets when struck by falling objects.

In 1959, the last year for which detailed figures are available, 14,547 industrial workers were injured as a result of being struck by falling objects and 72 of them died. Of the total injured, 9,029 had head injuries.

PLANS ARE being considered by the British Transport Commission in consultation with Richard Thomas & Baldwins, Limited, to enable Newport (Mon) docks to be served by the largest iron-ore carriers. RTB's new Spencer steelworks is being built at Llanwern, near Newport.

FRENCH STEEL MARKET

Exports Contribute to Rising Orders

From Our Special Correspondent

OVERALL figure for orders received by French steel mills during the past weeks has been about 5 per cent. above the level in March, due mainly to a rise in export orders. Conditions in the home market continue to be favourable and activity by boilermakers, steel fabricators, and machine-tool manufacturers has increased since the end of 1960. Agricultural machinery has made a marked recovery, and the level of building and construction work has also been rising.

Orders for concrete reinforcing bars have not yet followed this increase, indicating that stocks built up last year are being reduced to their normal levels. Though no basic change has been noted in the shipbuilding industry, activity is expected to improve in the future. Car manufacturers, though still cautious in their forecasts, tend to be somewhat more optimistic in view of the increasing number of registered new cars, which for the first quarter was 18 per cent. above the 1960 figure.

A general stability in home orders for steel is attributed to the existence of stocks in several sectors and to reduction of delivery dates, as well as to increased imports from ECSC countries made by buyers who wanted to cover against a possible rise in French steel prices. On the other hand, exports to ECSC countries have also risen and have been about 40 per cent. above the 1960 level for the first quarter of the year.

This increase was reflected in almost all products and all destinations, but particularly affecting Germany and Italy. Exports to non-ECSC countries have also gone up noticeably, the figures for April being 40 per cent. above last year. An increasing demand from the United States has been one of the interesting features of this rise.

Taking account of these various factors, French steelmakers, though rather cautious, consider the market is fundamentally sound and expect to reach their 18,000,000 tons target for 1961.

JAPANESE STEEL INDUSTRY'S NEED FOR ORE CARRIERS

WITHIN the next five years Japan will require 83 new coal and ore carriers to meet the needs of her steel industry, the Japan iron and steel association has stated. Construction of these vessels is expected to cost 260,000,000,000 yen. At present the steel industry has 25 ore carriers, but this is believed to be quite insufficient to carry the imports of raw materials for steel production five years hence.

Import requirements of iron ore in 1965 are estimated at 25,000,000 tons, and the main sources of supply will also come to include such distant areas as West Africa and South America.

M. & C. SWITCHGEAR, LIMITED—Mr. Iain Smith has been appointed to the board.

Aid Urged for Shipbuilding

THE Government should consider relieving particular industries, such as shipbuilding, from the greatly increased burden of local rating, now imminent because of revaluation and the abolition of industrial derating, says Mr. R. Cyril Thompson, senior vice-president of the Shipbuilding Employers' Federation. Writing in the National Provincial Bank Review, Mr. Thompson, chairman of Joseph L. Thompson & Sons, Limited, Sunderland, says that this increased burden will weigh heavily on the shipbuilding industry at a time of great difficulty and few orders.

He suggests that the Government has a duty to ensure that neither the shipping nor shipbuilding industries is at any marked disadvantage with oversea competitors who are helped either by direct subsidies or by taxation reliefs. It should also tackle the problem of enabling British shipbuilders to match the credit terms obtainable in other countries. Financial inducements to shipowners to scrap old tonnage were just as important.

Executive Changes in AEI Cable Division

FOLLOWING reorganization of the cable division of Associated Electrical Industries, Limited, Mr. J. S. A. Bunting, formerly joint divisional general manager, has been elected to the board of Associated Electrical Industries (Woolwich), Limited. AEI cable division is one of the four AEI product divisions in the Woolwich Group. The following appointments have also been made in AEI cable division:—Mr. E. J. Vidler, divisional general manager and director of AEI Divisional Management Company; Mr. F. V. Vaissiere, divisional commercial manager; Mr. V. L. J. Plascott, divisional manufacturing manager; Mr. W. G. Hawley, divisional chief engineer.

The operation of AEI cable division is now organized into four product groups: power cable (sales manager, Mr. K. S. Estlin); Super Tension cable (sales manager, Mr. R. G. Holland); rubber and plastic cables and wires (sales manager, Mr. D. Beavan); distribution equipment and accessories (sales manager, Mr. H. Hubbard).

LONDON HYDRAULIC POWER COMPANY, LIMITED—Mr. J. S. Dent has been appointed a director.

Personal

Rubery Owen Chief to Appear on TV

CHAIRMAN and joint managing director of Rubery Owen & Company, Limited, the structural and manufacturing engineering group, Mr. A. G. B. Owen, who is listed in the Directory of Directors as holding appointments on the boards of a total of 73 steel, engineering, and other companies, is to appear in the series "It Happened To Me" on BBC television on Tuesday, June 20, when he will be interviewed by James Buchan.

Mr. Owen, says a BBC preview of the programme, works an 80-hour week in industry, has his weekends booked up a year in advance with preaching and youth work, and also finds time to help run orphanages and hospitals and devise new welfare schemes for old age pensioners. His driving force, a practical Christianity, has helped him build his industrial empire based on co-operation with his workpeople. He says: "If you treat a man as a brother, usually he'll behave like one. This makes life happier all round."

Mr. FRANCIS M. W. HIRD, secretary of Frederick Smith & Company, Limited, wire manufacturers, of Halifax (Yorks), has been elected president of the Institute of Cost and Works Accountants.

Mr. CHARLES H. BRADY, manager of the mill office at the Cargo Fleet Iron Works, Middlesbrough, of South Durham Steel & Iron Company, Limited, has retired. He joined the firm 41 years ago.

Dr. ROBERT H. ESSENHIGH, who has been doing research work at the department of fuel technology and chemical engineering, University of Sheffield, has been appointed to an associate professorship at Pennsylvania State University.

Owing to continued ill-health Mr. TOM LEWIS is retiring from his post as deputy director of industrial relations, South-Western Divisional Coal Board. Before taking up the post eight years ago he was labour officer in the No. 4 Area of the division.

Head of the fuel technology and chemical engineering department at Sheffield University, Prof. M. W. THRING is to pay a fortnight's visit next month to the Argentine to assist in the establishment of a department of fuel technology at the Buenos Aires University.

After 50 years with the company, Mr. JOHN A. SHAW, construction department manager, Head Wrightson Teesdale, Limited, blast furnace and steelworks plant manufacturers, of Stockton-on-Tees, has retired. He joined the firm as an apprentice template worker.

A combined total of 126 years' service is represented by three senior officials who retire this week from Leyland Motors, Limited. They are Mr. C. C. HODGSON, chief metallurgist, Mr. J. SOWERBUTTS, assistant accountant, and Mr. H. S. FORD, works manager of the Chorley Works.

Sales director of Robert Hudson, Limited, light railway equipment manufacturers, etc., of Leeds (Yorks), Mr. J. M. ODDIE is on a three weeks tour of Canada and the US. He will meet representatives of international corporations in Toronto, Detroit, Washington and New York.

Chairman of Vickers, Limited, VISCOUNT KNOLLYS is one of the 39 world business leaders appointed to the International Advisory Council for the International Industrial Conference to be held in San Francisco from September 11 to 15. The meeting is to consider problems and issues facing the world economy over the next decade and to define more clearly the role of private enterprise in meeting these challenges.

In our last issue it should have been stated that Mr. N. C. MACDIARMID, who has been appointed a part-time member of the Iron and Steel Board, is managing director of the Staveley Iron & Chemical Company, Limited. He is also a director of Stewarts and Lloyds, Limited, and managing director of the Stanton Ironworks Company, Limited.

Senior partner in R. Wolff & Company, Limited, metal brokers and merchants, Mr. J. D. WOLFF has resigned because of age as chairman and from the board of Metal Market & Exchange Company, Limited, which controls the London Metal Exchange. The new chairman is Brig. H. P. CROSLAND, who has been a director since 1937. Although in his 85th year, Mr. Wolff will continue as a partner in R. Wolff & Company.

Mr. WILLIAM KEEN, melting technical adviser of Jessop-Saville, Limited, Sheffield, a subsidiary of the Birmingham Small Arms Company, Limited, has been elected president of the Electric Steel Makers Guild of Great Britain. Mr. Keen, who has been with Jessop-Saville for 47 years, is a member of the Iron and Steel Institute, the Institute of British Foundrymen, and the Sheffield Metallurgical Association, and an associate member of the Institute of Metallurgists.

Since vesting day in 1947, chief electrical engineer, West Ayr Area, Scottish Divisional Coal Board, Mr. JOHN MCOWAT retired on May 30. He will be succeeded by Mr. W. W. Erskine, who has been his assistant for some years. Mr. McOwat is a past president of the Glasgow and West of Scotland branch of the Association of Mining Electrical and Mechanical Engineers and a past national vice-president of the association.

Long-service awards are to be presented to more than 100 men employed by the Richardsons, Westgarth & Company, Limited, group of companies. Recipients will include Mr. W. R. JONES, managing director of George Clark (Sunderland), Limited, who has 40 years' service; Mr. J. H. BAXTER, personnel officer, Parsons Marine Turbine Company, Limited (40 years), and Mr. J. W. ARMSTRONG, assistant works manager, George Clark (Sunderland), Limited (25 years).

Vickers' Chairman on Threat of Rising Costs

WARNING on the threat of ever-rising costs, Viscount Knollys, chairman of Vickers, Limited, said at the annual meeting that the problem is not only serious for the company but also for the nation as a whole. He maintained that there must be a consistent and co-ordinated national policy aimed at growth rather than mere stability. "Private initiative without a Government policy complementary to it can be rendered ineffective."

Lord Knollys said that Vickers was attacking the problem of costs and stimulating ideas for growth in every sphere of its activities. Although profit margins of some of the group's engineering works looked like being lower, group business so far this year had been maintained at a similar level to the latter part of 1960, and if the rest of the year turned out as could be expected at the moment, the 1961 results might not be greatly different from last year's. He reported that shipbuilding profits at least should be rather better.

Scots Miners' Warning

"SUICIDE" TO DEPEND ON FUEL OIL IMPORTS

CALLING for a fuel policy which would give the coal industry its "proper place" in the national economy, Mr. Abe Moffat, president of the Scottish Area of the National Union of Mineworkers, said it would be economic suicide to destroy the only national raw material asset and depend on imported fuel oil. "During the last three years and following the recession of 1957, we have witnessed a contraction in the industry unprecedented since the days of 1930," he said.

Mr. Moffat, who was addressing the annual conference of the Scottish Area of the NUM at Aberdeen, said that manpower in the industry had reached its lowest level of the century with 582,000 in Britain and 71,000 in Scotland. The worst effect of the policy had been on youth, as 50 per cent. of the men who left the mining industry during the period were below the age of 31.

This arose from the policy of the Government, which was more concerned with protecting the interests of the big oil monopolies than the only raw material the country possessed. "Profit is their main concern, and all the talk by the Government about freedom of choice for the consumer is simply a smoke screen to ensure that the big oil monopolists will continue to make high profits at the expense of the nationalized mining industry and the miners."

Wage Increase Sought

Mr. Moffat said that this was brought out forcibly when it was realized that during the period of contraction in the mining industry, oil consumption had increased from the equivalent of 37,000,000 tons of coal to 65,000,000 tons—an increase of 75 per cent. People in the oil-producing countries would not continue to allow their oil resources to be exploited, and would one day take over their own industries, he maintained. With that development, Britain's economy could be placed in the very dangerous position of having no oil resources of its own, and having allowed the coal industry to be sacrificed.

A call to the NUM national executive to submit a claim for a wage increase of 3s. 4d. a shift, the equivalent of £1 per week, for the 300,000 day-wage workers in the industry was approved. Mr. Alex Moffat, vice-president, moving the resolution, spoke of a "dangerous precedent" in a resolution to the union's national conference suggesting that wage increases should be linked with productivity. This could be a serious matter for the miners, he said.

Concern over recruitment and safety was expressed when a proposal to introduce a three-year apprenticeship scheme for all youths entering the mining industry was agreed. Mr. T. McCombe (Glenburn), said such a scheme was in keeping with the system in other industries and would act as an incentive to keep young men in mining.

Mr. M. Wilson, East Whitburn, called for a bold and imaginative scheme to ensure that the miner of tomorrow would be able to meet the new order of mining. The industry, he said, was fast becoming an ageing industry with little or no attraction for the school leaver. It was a "hole in the ground" to fall into when they became despondent in their fruitless search for work in more respectable and less hazardous industries. The NCB was aware of the problem, but as yet no solution had been found.

The present system of training was totally inadequate, said Mr. R. Whiteside, Mauchline. New and better machines were being introduced, but there was little thought being given to those who were to operate them. In Scotland, 96 miners had been killed in 1960, the highest since nationalization, and since 1951 the number was 541, with over 2,000 injured. The price of coal was extremely high, but need not be, so with a proper training scheme, he maintained.

A resolution supporting the NUM's protest against the granting of a licence to the Steel Company of Wales, Limited, to import coking coal from America, warned that the Scottish miners would unite with those in South Wales in calling for strike action to stop "this destruction of the mining industry." Mr. Abe Moffat maintained that the real reason for the application to import American coal, and to increase the price of steel at the same time, was to increase the profits being made by the steel industry.

Speaking on a resolution protesting against the Rating and Valuation Act, Mr. A. Eadie, Glencraig, said that if the new valuations were imposed on miners' institutes, community centres, and bowling greens, the whole social and recreational life of miners would be affected.

Successes in RICS Mining Surveying Examinations

IN the final examination, mining surveying section, of the Royal Institution of Chartered Surveyors 1961 examinations, the following candidates were successful:—

Mr. W. S. Allen, production department, National Coal Board, London; Mr. J. Baxter, survey department, No. 6 (North Barnsley) Area, North-Eastern Divisional Coal Board; Mr. E. G. Frost, mining department, West Nottinghamshire Technical College; Mr. P. G. Hand, survey department, Sneyd Colliery, Burslem, Stoke-on Trent; Mr. E. Haycock, survey department, No. 4 (Carlton) Area, North-Eastern Divisional Coal Board, Mr. Ivor Hutchinson, survey department, Durham Divisional Coal Board; Mr. L. H. Johnson, survey department, Northern (N&C) Divisional Coal Board; Mr. J. Yates, survey department, No. 2 Area, North-Western Divisional Coal Board, and Mr. J. M. Y. Lindsay, surveyor's department, East Ayr Area of the Scottish Divisional Coal Board.

Appointments

Superintendent of SCOW Steel Plants

ASSISTANT superintendent, steel plants, of Steel Division of the Steel Company of Wales, Limited, since January, 1960, Mr. R. P. MACKAY has been appointed superintendent with effect from July 1. Mr. Mackay, a native of Banbury (Oxon), was educated at Magdalen College, Brackley.

MR. R. P. MACKAY

He joined the company in 1934 as a student trainee in the Margam coke ovens, and was later transferred to the melting shop at the Cardiff works of the company as an assistant sample passer. In 1939 he was appointed assistant manager of the Margam melting shop and in 1944 took over the post of manager. He was made manager of the Abbey melting shop in 1955.

MR. ROGER H. BLACKMAN has been appointed general manager, under the chairmanship of Sir Maurice Adams, of R. & M. Plant, Limited, a new contractors' plant hire company, of Wealdstone (Middx).

Senior lecturer in the Department of Electrical Engineering, Birmingham University, Mr. J. T. ALLANSON has been appointed to the newly-established second chair in the Department of Electrical Engineering from October 1.

Mr. A. T. EASTERBROOK has been appointed general manager of the furnace building and contract department of the Wellman Smith Owen Engineering Corporation, Limited, in succession to Mr. G. Talbot, who has resigned.

Mr. D. C. JARDINE has been appointed senior sales engineer for telecommunications products, British Insulated Callender's Cables, Limited, operating within BICC home sales organization from 21, Bloomsbury Street, London, W.C.1.

Mr. WILFRED LADDS, who for the past four years has been machine shop superintendent at the Peterborough diesel engine factory of F. Perkins, Limited, has been appointed chief resident inspector for the Perkins Group in India.

Former chairman of the Metropolitan-Vickers Production Association, Mr. J. H. ELVIN has been appointed assistant superintendent, traction manufacturing department, traction division of Associated Electrical Industries, Limited.

Mr. J. R. HOLLIDAY has been appointed publicity manager of British Ropes, Limited, wire rope manufacturers, of Doncaster. He was formerly with Wailes Dove Bitumastic, Limited, Hebburn (Co. Durham), where he held a similar position.

COUNCILS OF Manchester University and the Manchester College of Science and Technology have approved the appointment of Dr. Franz Koenigsberger to the newly-created chair in Machine Tool Engineering in the Faculty of Technology. Dr. Koenigsberger was appointed lecturer in mechanical engineering in the Manchester College of Science and Technology in 1947, senior lecturer in production engineering in 1955 and Reader in Machine Tools and Production Processes in 1957.

Mr. D. MAJOR has been appointed assistant chief engineer of the X-ray department of the instrumentation division, Associated Electrical Industries, Limited. He joined Metropolitan-Vickers Electrical Company, Limited, in 1948 as a college apprentice.

Mr. G. A. JONES, formerly South Wales regional manager for Grant, Lyon & Company, Limited, railway and civil engineers, of Scunthorpe, has been appointed the company's technical representative for England and Wales, with the exception of Durham and Northumberland. Grant, Lyon is a member of the Chamberlain Industries group of companies.

New BISRA Research Section for Control Engineering

NEW section of its Plant Engineering and Energy Division has been created by the British Iron and Steel Research Association to centralize its research into control engineering. When the Plant Engineering and Energy Division was formed, an electrical engineering section was included to carry out research into the electrical equipment used in steelworks. During the last few years, and with the increasing interest being shown in automation in the iron and steel industry, the research of the section has tended more towards the electrical engineering aspects of automatic control systems—their design, construction, and application to steelworks plant. Some work on hydraulic control systems has also been carried out in another section of the division.

The basic theory of control applies to both, and in view of the advantages to be gained in bringing all the work in the division on control engineering within one section, the electrical engineering section has been replaced by a new control engineering section, which will continue the present research into the electrical engineering problems of steelworks, with the addition of work on hydraulic control.

The association has appointed Mr. J. P. Clyne, who recently joined BISRA from the Sperry Gyroscope Company, Limited, as head of the new section.

Furnaces Closed for a Week at Stewarts and Lloyds

SIX melting furnaces at the Clydesdale steel and tube works of Stewarts and Lloyds, Limited, have been temporarily closed to bring ingot production more into line with the receipt of new orders. A company spokesman said on Wednesday that the closure was for a week only, and affected between 800 and 1,000 men. The works is due to reopen on Monday. Meanwhile production of tubes at the No. 1 and No. 2 mills is continuing on a four-day week basis.

While the steel plant had been working a full week until the time of the closure, the tube mills have been intermittently operating on a four- or five-day basis since before Christmas. The main difficulty faced by the firm still appears to be the slackness of demand for pipes from the oilfields. The recent order placed with it by Trinidad for steel water pipes is expected to secure employment at the tube works in Coatbridge, Lanarkshire, for some time ahead.

Price Stability

PRIORITY FOR THE COALMINING INDUSTRY

GREATEST threat to the future of the coal industry is the consumers' fear of rising prices. "It is absolutely essential for us to ensure price stability. This means that all increased costs must be paid for by constantly rising productivity." This was one of the main points made by Mr. Alfred Robens, chairman of the National Coal Board, in the closing speech at the annual conference of the National Association of Colliery Managers in Edinburgh, yesterday (Thursday).

"Can we do this?" Mr. Robens asked. The answer was an emphatic yes, provided management and men realized this truth and co-operated in improving productive efficiency. "Failure to do so will inevitably mean a further contraction of the industry in the face of intense competition from oil."

Output per manshift, which had reached record heights in 1960, had risen by nearly another 2 per cent. That was good going, but further improvements were possible and essential.

Key to Increased Efficiency

Emphasizing that mechanization was the key to increased efficiency, Mr. Robens said it was not, however, simply a matter of buying and installing machines. They must use them to the full to get the maximum return on the investment they represented. This could only be achieved by working the machines over two or three shifts wherever possible instead of one, by reducing the machine time lost in stoppages, and by seeing that every man in the pit behind the coal face and on the surface was used 100 per cent. effectively.

For the miner mechanization meant greater safety, as the record of the East Midlands Division showed. This division had the highest o.m.s., the highest proportion of fully mechanized output, and the lowest accident rate.

The NCB chairman said the output this year would be about 190,000,000 tons. Demand for coal was likely to approach 200,000,000 tons so the industry would again be able to reduce its stocks. This year another 6,000,000 tons had been lifted and sold, making a total reduction of 13,000,000 tons from the peak figure of 36,000,000 at the end of 1959. The end of the surplus stocks was in sight, for the industry would need to carry a planned level of stocks of some 10,000,000 tons.

Mr. Robens' speech will be reported fully in next week's issue of IRON AND COAL.

Trade with Russia to be Increased

FOLLOWING trade talks in Moscow between Mr. Reginald Maudling, President of the Board of Trade, and the Soviet Foreign Trade Minister it was agreed that quotas for consumer goods, machinery, equipment, and other goods, for the year ending June 30, 1961, would be extended for another six months with a corresponding 50 per cent. increase in the individual quotas.

At talks to be held in London in October or November, quotas for 1962 will be fixed and Mr. Maudling has suggested that all these quotas be doubled.

Mr. Robens' Warning to "Rebel" Enginemen

WARNING members of the "rebel" National Union of Winding Enginemen that their organization was not recognized by the National Coal Board as a negotiating body, a notice, signed by Mr. Alfred Robens, chairman of the board, was posted at pitheads in Co. Durham last week. The drive by the breakaway union has resulted in 200 of the 350 winding enginemen in Co. Durham transferring from the NUM to the new organization.

Mr. Robens' notice says: "Attempts are being made to persuade winding enginemen to join a new union outside the NUM. I have made personal efforts to make possible a settlement of the differences between the conflicting elements, but the representatives of the winding enginemen are not prepared to accept these proposals, although the NUM is prepared to do so."

The notice goes on, "The board recognizes as a negotiating body for winding enginemen only the NUM, which is already a party to national agreements covering these workers. The board . . . wishes to make this point perfectly clear so that no employee will be misled into a decision based on a wrong assumption."

Answering a suggestion made last month by Mr. Robens that conflict between the NUWE and the NUM would do irreparable harm to the industry, Mr. C. E. Guest, secretary of the NUWE, said in a statement on Thursday of last week, that his union has had as its first consideration the continuation of production, entirely divorced from industrial action. His statement went on: "We will not be intimidated by the dictatorial methods of the NUM. The NUWE has agreed to a settlement of differences, but not under the terms insisted on at recent talks in London."

New Vickers Plant in Australia

COSTING about £A1,500,000, a heavy engineering plant is to be erected and equipped at Port Kembla, by Vickers, Limited, which will add to the company's already large existing interests in Australia.

The new plant is to be built close to the works of Australian Iron & Steel, Limited, and will be capable of undertaking the manufacture of a wide range of local requirements.

THE NAME OF Drayton Regulator & Instrument Company, Limited, has been changed to Drayton Controls, Limited. The telephone number is unaltered.

President of Indian Mines Rescue Body

SINCE 1958 Regional Inspector of Mines for Special Investigation Duties, Mr. G. S. Marwaha (35), has been appointed the new president of the Central Coal Mines Rescue Stations Committee of the Government of India, which, constituted of representatives of mineowners, mine managers and workers, is responsible for the establishment and running of rescue stations for coal mines throughout India.

MR. G. S. MARWAHA

A Pickering Medallist of the Indian School of Mines, he was at the University of Birmingham in 1947-50 as a post-graduate scholar and studied the mechanization and reorganization of the British and continental coal mining industry, and problems of mine ventilation. On return to India, he joined the Department of Mines and in 1956 was the youngest officer to be appointed Regional Inspector of Mines.

In 1958 Mr. Marwaha was appointed to the newly-created post of Regional Inspector of Mines for Special Investigation Duties, in which capacity he was associated with the framing of new codes of Coal Mines Regulations, Coal Mines Rescue Rules, and Metalliferous Mines Regulations. A council member of the Mining, Geological and Metallurgical Institute of India since 1955, he represents the Chief Inspector of Mines in India on several committees of the Government of India and the Indian Standards Institution, and is chairman of the steel wire and wire products section committee of the latter body. He is also secretary of various mines safety and technical committees.

Minister Considering Methane Imports

DETAILS of the Gas Council's proposed scheme for transporting methane from North Africa to the UK have been forward to the Ministry of Power for consideration by the Minister, Mr. Richard Wood. As announced in last week's IRON AND COAL, agreement has been reached on the scheme between the Gas Council, the French producer companies, and Conch International Methane, Limited, who will be responsible for the shipping.

The scheme provides for the importation of about 350,000,000 therms (about 700,000 tons) of liquid methane a year, which is equivalent to 10 to 15 per cent. of the present total demand in the UK. If the agreement is sanctioned by the British and French Governments, the gas will be liquefied at a plant to be built on the Algerian coast at Arzew, near Oran, and shipped by special tanker to Canvey Island.

Gamma Ray Machine will Revolutionize Mining

FOLLOWING a tour of Lancashire's new Parkside Colliery, which is costing £13,000,000, Mr. Alfred Robens, chairman of the National Coal Board, disclosed last Friday that the colliery will be the first in the world to have the new gamma ray machine which would revolutionize mining. He said the machine could, by remote control, move all the props in a 200-yd. coalface and with scientific aids select only the good coal for marketing. Scientists were now perfecting the device.

Mr. Robens stated that through mechanization the coal industry could maintain stability of prices. The present 40 per cent. mechanization in the pits would be increased to 80 per cent. by 1965. If the present wastage in manpower continued, Lancashire would be 2,000 men down by the end of this year, he revealed. The NCB and the unions were discussing recruitment and with the new techniques as well as improving safety and the standard of mines, they would get recruitment, he added.

Referring to the European Common Market, Mr. Robens said that the NCB need not fear the importation of coal, because the UK could always produce the cheapest. No other colliery in Europe had been partly completed at the same speed as Parkside, where records had been broken in sinking the shaft. From cutting the first sod to producing coal took 10 years, but at Parkside three years had been cut off the programme through speed and efficiency.

The new colliery will be capable of producing 1,000,000 tons of coal a year for the next 100 years and all the men from pits being closed would be absorbed. In south-west Lancashire three pits would close when Parkside came into full production.

New Radio Signal System at Lothians Colliery

NEW signalling system which will help to eliminate accidents has been installed in Easthouses Colliery (Midlothian). Operated by radio, it is installed in the bogies which carry the men to the coalface. A transmitter is installed in each bogie, and a receiver is in the engine driver's compartment. By pressing a button in the bogie, a miner can signal to the driver to stop should they run into any smoke or other trouble.

The system in most collieries at the moment consists of a wire running alongside the incline track and the men have to catch hold of it to give a signal. With the radio system, the signal is flashed to a strip indicator on the driver's receiver who can tell immediately which bogie has signalled.

A system which would enable speech to be used instead of radio signals is being studied, and when perfected will probably be installed in other collieries, said a spokesman of the Scottish Division of the NCB.

FULL-TIME COURSE lasting three weeks on "Statistical Quality Control and Acceptance Sampling" is to be run by the College of Advanced Technology, Birmingham, starting on Monday, September 11. Primarily intended as an introduction to the subject, the course will be directed by Mr. J. D. Morrison, principal lecturer in metrology and quality control in the Production Engineering Department.

National Association of Colliery Managers

THE EDINBURGH CONFERENCE

MR. A. E. HISCOX IS THE NEW PRESIDENT

OFFICE of president of the National Association of Colliery Managers for 1961-62 is to be filled by Mr. A. E. Hiscox, a past president of the association's South Wales Branch. Mr. Hiscox, who is Area production manager of No. 6 Area of the South-Western Divisional Coal Board, was elected to succeed Mr. H. H. Wilson as president at Tuesday's annual meeting of the NACM, held in Edinburgh. "Progress—with Safety" was the theme of the annual conference, which ended yesterday (Thursday). This year's conference, under Mr. Wilson's presidency, attracted a record attendance.

Safety has, of course, been considered from time to time at NACM conferences, but this was the first time that it had been the primary theme. Many aspects of the subject were discussed at length by the various contributors to the technical sessions.

Official opening of the conference on Tuesday morning by the Lord Provost of Edinburgh was followed by the annual general meeting, at which Mr. Wilson gave his presidential address (see p. 1221). An address by Mr. E. H. Browne, deputy chairman of the National Coal Board, followed the annual meeting, and in the afternoon there were papers by Dr. William Reid, chairman of the Durham Division Coal Board ("Campaigning for Greater Safety"), and by Dr. P. G. Taigel, the NCB's chief proving and acceptance engineer ("Developing and Proving at the Central Engineering Establishment").

Sir Andrew Bryan's Address

There was only one technical session on Wednesday, when Sir Andrew Bryan submitted a paper on "Accidents in Mines—Principles of Prevention." The afternoon was given over to a cruise down the Firth of Clyde. The new president was in the chair for yesterday's opening technical session, when Mr. W. J. Adcock, head of the NCB's strata control branch, and Mr. H. Cunliffe, strata control engineer, Scottish Divisional Coal Board, presented a paper on "Safety in Relation to Modern Forms of Support." This was followed by the closing address to the conference by Mr. Alfred Robens, chairman of the National Coal Board, when the chair was taken by Mr. Wilson, the retiring president. The association's annual dinner and dance was held last night.

A feature of the Edinburgh conference was the safety exhibition organized by the Safety in Mines Research Establishment and the National Coal Board. The exhibition, the subject of an article in last week's IRON AND COAL, attracted considerable interest. The various social functions, including the special arrangements made for the ladies, were well supported.

A full account of the annual meeting and conference will appear in our next issue.

("Colliery Managers' New President," p. 1218)

Mining at Soviet Exhibition in London

TWENTY different working models of automated mining plants or sections of them, as used in Soviet mines, will be shown in the "Coal" section of the Soviet Industrial Exhibition at Earls Court, London, next month. The "A-2" and the "A-3" plants will be shown in scale models, while the "KM-87" will be a full-size unit.

A working model of the "OMKT" (Tula) mechanized stoping unit, as well as full-size sections of it, will also be included.

Other photographs and models will illustrate holiday homes, sanatoria, boarding houses, and hotels built for miners and their families, both in the mining areas and in Black Sea health resorts.

EXCISE DUTY ON INDIAN COAL

THE Lok Sabha, New Delhi, has passed the Coal Mines (Conservation and Safety) Amendment Bill, which seeks to raise the limit of excise duty on coal from Rs. 1 to Rs. 4 per ton.

The main purposes of the measure are to provide financial assistance to the Coal Board to meet the cost of a central ropeway scheme in connection with stowing operations in some coalfields and to provide an "element of subsidy" on the long-distance transport of coal by ship to the coastal States in the south and the west of India.

World Trade in Steel

Data on exports of iron and steel, by products and by destination, for selected years between 1913 and 1959, are contained in "Statistics of World Trade in Steel, 1913-1959," published by the Economic Commission for Europe and available from the Sales Section, European Office of the United Nations, Geneva, price 42s. 6d. The volume, which has nearly 500 pages, is a major source of information in its field.

Colliery Managers' New President

NEW president of the National Association of Colliery Managers, Mr. A. E. Hiscox, has held his present position as Area production manager, No. 6 Area, South - Western Divisional Coal Board, since 1955. He previously held a similar appointment in the No. 5 Area.

MR. A. E. HISCOX

A native of Dudley (Worcs), where he was born in 1899, he was educated at Crumlin and Britannia Mining Schools, where he obtained his colliery manager's certificate of competency and from where he was given an opportunity by Powell Duffryn of studying mining conditions in Germany, Nottinghamshire, Yorkshire, Northumberland, and Scotland.

He started work as a boy at Britannia Colliery, Pengam, in 1913, and, except for two years when he served in the army with the Machine Gun Corps in the 1914-18 war, he remained there in different official capacities until he was appointed undermanager. In 1929 he was appointed undermanager at Bargoed Colliery, in the Rhymney Valley, and two years later was appointed undermanager at Groesfaen.

In 1936 Mr. Hiscox was made manager of Britannia Colliery while a big reorganization scheme was undertaken in the North Pit. In 1939 he was transferred to Abercynon Colliery as manager, to undertake and complete a change-over to 100 per cent. machine mining. In 1945 he was appointed agent at the Lower Rhondda group of collieries, which included Lewis Merthyr, Ty Mawr, Maritime, and Cwm collieries. In April, 1947, he was transferred by Powell Duffryn to Monmouthshire as northern sub-area general manager.

Mr. Hiscox is the author of a number of technical papers, one of which, "Simultaneous Extraction of Contiguous Coal Seams," won him the Silver Medal of the NACM.

Mr. Hiscox will give his presidential address to the association at next year's conference, which is to be held in Cardiff.

Mine Management in India

QUALIFICATIONS of mine managers in India were discussed by Mr. J. S. Grewal, general manager of the Raneegunge Coal Association, Limited, at the annual dinner of the Indian Branch of the National Association of Colliery Managers, held on March 11.

Selection of future mine managers and management personnel generally ought to be carried out very carefully and with due regard to the hazardous nature of mining, he said. Selection of managers should be based on written as well as practical examination and be followed by personal interviews and psychological tests to ascertain the aptitude of the person. No less important was a thorough medical examination, while Mr. Grewal expressed the view that business management, industrial and personnel relations, and accountancy should be compulsory subjects in managerial examinations.

The urgent need for more colliery managers should not be allowed to be the overall consideration in the selection of new managers. Only those showing real promise and possessing the necessary capabilities should be appointed.

The speaker felt that the present system of classification of the mine managers' examinations into first and second class should be replaced by a single examination. Initially, the successful candidate should be eligible to work only as assistant manager and, after two years in that capacity, he should be eligible to be manager of a second-class mine only, an appointment to be held for a further two years. After that, and before being allowed to manage a first-class mine, the man should have to pass a further practical examination.

Coal Mining in Queensland

OUTPUT of saleable coal in Queensland, Australia, during 1959, according to the report of the Chief Inspector of Mines, contained in the annual report of the Under Secretary for Development of Mines, was 2,594,000 tons, almost the same as in the previous year. Drilling was continued in selected areas to prove coal resources for future requirements.

Increased mechanization in underground coal winning is the principal feature in the State's larger mines near Ipswich. This has resulted in a greatly increased output per manshift. In addition, considerable improvement continued to take place in the preparation of coal for marketing in the Ipswich and West Moreton areas.

Foundry Practice Wall Charts

A new set of 15 charts suitable for wall display and covering every aspect of foundry practice has been published by the Council of Ironfoundry Associations, in collaboration with Educational Productions, Limited. The charts, 37 in. by 25 in., are based upon a revision of an earlier series published several years ago. Each set costs £5.

NATIONAL ASSOCIATION OF COLLIERY MANAGERS

General Council's Report for Year 1960-61

THE council regrets that a year which was relatively free from major incidents was marred by the explosion at Six Bells Colliery, with its regrettable loss of life. While the council remains disappointed with the rate of progress achieved in accident prevention generally, it nevertheless acknowledges gratefully the efforts which have been made to reduce the hazards unfortunately associated with mining operations and to cut the number of fatal and non-fatal accidents to more acceptable figures.

Foremost in prosecuting these efforts has been the colliery manager, who, by the nature of his work and responsibilities, is in the forefront of the battle against accidents. No one, however, can fail to be perturbed at the accident figures presented year by year.

Safety Deliberations

Ways and means of improving safety in the mines have formed the main topic of discussion at each of the meetings of the council and its Safety and Policy Committee held during the past year. The council unfortunately cannot claim any spectacular results, or even to have found a new approach to the problem, but it believes that its deliberations, and the discussions thus initiated at branch meetings, have not been without effect. The council welcomed the decision of the president to make "Progress—with Safety" the theme of the 1961 conference. It believes that day-to-day management of the pits still holds scope for profitable action in removing or lessening some of the hazards of mining, and it recommends careful study by managers of the presidential address to this year's conference. Traditionally, the presidential address is not discussed at the conference, but the council feels that it could properly and with profit be the subject of discussion at branch meetings.

The association is represented on the Safety and Health Committee of the Coal Industry National Consultative Council. The NACM council acknowledges with gratitude the deliberations of this committee in the interests of safety, in which its own representatives have played a valuable part. It gratefully acknowledges the services of NACM representatives on this and other committees and sub-committees—services which have meant the expenditure of a good deal of time and a lot of hard work on behalf of the industry as a whole.

The association was represented at the Six Bells inquiry by its technical adviser, Sir Andrew Bryan, who also represented BACM under the liaison arrangements between the two associations. The council once more records its gratitude to Sir Andrew for his services to colliery managers.

In its report for 1959/60 the council recorded the view that the cross-examination of witnesses at the Walton Colliery inquiry had some unfortunate and undesirable features. These were gratifyingly absent from the Auchengeich inquiry, but the Six Bells inquiry again raised misgivings, particularly in regard to newspaper reports during the conduct of the inquiry.

A meeting was sought with the Chief Inspector of Mines, and duly took place, Mr. A. Rake, of the Ministry of Power, also being present. The president, and the president of BACM, who were accompanied by the hon. secretary of the National Liaison Committee, put forward certain views on official inquiries and the conduct of them. The two presidents had a sympathetic hearing from the Chief Inspector, and it is the view of the council that the meeting was of great value. Among the matters raised was the employment of counsel at inquiries. The two presidents expressed the view that an official inquiry should be a technical investigation into the causes and circumstances of an incident. As it was, extraneous matters tended to intrude, and were often seized upon in Press reports. At the Six Bells inquiry, NACM and BACM were content to be represented by their technical adviser, and were highly satisfied at the way in which he fulfilled his task, but they might feel in the future that they also should be represented by counsel.

Subsequent to and arising from this meeting with the Chief Inspector, an unofficial meeting took place with Mr. H. E. Collins, at which the NACM, BACM, the NUM, and NACODS were represented. Mr. H. H. Wilson represented the NACM. The general opinion was that the various parties should get together with a view to refraining from engaging counsel at official inquiries. The council is pleased at the outcome of both these meetings.

Auchengeich Colliery Prosecution

Arising out of the fire at Auchengeich Colliery in September, 1959, the manager and undermanager of the pit appeared before the Sheriff Court of Lanarkshire in December, 1960. Counsel was engaged for the defence, through the Liaison Committee, and Sir Andrew Bryan gave advice on technical matters.

The proceedings lasted eight days. Both the manager and the undermanager have expressed complete satisfaction with the support they received.

The president and the technical adviser, together with Mr. Jim Bullock, president of BACM, met Mr. J. C. George, Parliamentary Secretary of the Ministry of Power, on March 27, 1961, in connection with the official report on the explosion at Cardowan Colliery. The purpose of the meeting, held at the request of the National Liaison Committee, was to make strong objection on behalf of management to the official report on the explosion at Cardowan. The Scottish Branch of the association had written to the hon. secretary expressing the view that the tone of the report and some of its criticisms cast reflections on the management at Cardowan which were neither justified nor warranted by the facts. The president and the other NACM representatives on the National Liaison Committee concurred with this view, which was held also by the BACM executive. It was therefore decided to seek a meeting with the Minister. The delegation was sympathetically received, and the council regards the result of the meeting as satisfactory.

The council stated in its report for 1959/60 that the future position with regard to examinations for the colliery manager's certificate had been under consideration and was being pursued.

A sub-committee appointed by the council gave further consideration to this important matter during the year and has reported to the council. The Institution of Mining Engineers suggested in July that as there was a common interest a meeting between the two bodies seemed desirable. A meeting between the members of the sub-committee and representatives of the institution duly took place on September 12, Mr. H. A. Longden presiding. One outcome of the meeting, at which a full and frank discussion ensued, was a decision to recommend that a candidate with a degree, approved diploma, or national diploma be exempted from the Mining Technology papers set by the MQB. A letter making this recommendation, signed by the presidents of the IME and NACM, was duly sent to the Mining Qualifications Board.

The council will continue to keep a close watch on the position regarding examinations to ensure that any future changes are in the best interests of the coal-mining industry of this country and the profession of colliery management.

The council points to procedure in regard to the Six Bells inquiry, the Auchengeich prosecution, and the Cardowan inquiry as three instances among many during the year which show that the liaison arrangements between NACM and BACM in matters of defence are working well and efficiently in the interests of colliery managers. The council places great value on these arrangements and is anxious that they should continue. The council records its thanks to the NACM representatives on the National Liaison Committee and to the NACM members of the divisional liaison committees for the services they have rendered to the association.

The council notes with pleasure the satisfactory number and high quality of the technical papers presented for discussion at the various branch meetings, and congratulates the branches on the success which has attended their social functions.

Finally, the council records its thanks for the continued support given to it by branch officials and individual members of the association, membership of which is now at its highest level ever.

CREEPER FOR MINE-CAR LOADING

NEW type of creeper for controlling mine cars in the vicinity of loading points has been designed by Mr. H. Divens, formerly in the Alloa Area of the Scottish Divisional Coal Board. The creeper is for use at loading points where the more normal type of creeper installed between the rails is unsuitable, for example, at places where pavement water is prevalent or drop-bottom mine cars are in use.

Basically, a modified endless coal-cutter chain is arranged with its long axis parallel to the mine-car track and acts on the sides of the mine cars. The creeper consists of an RJS framework approximately 3 ft. high supporting a motor, gear case, and the chain race, the framework being situated adjacent to the track. The chain is a standard dreadnought coal-cutter chain of 40 boxes together with standard coal-cutter sprockets. In place of the picks, each box has a steel band welded onto the face to which friction pads are fitted.

The motor, 7½ h.p., 730 r.p.m., and reversible, is coupled directly to a reduction gearbox having a ratio of 75 to 1; this gives a chain speed of approximately 24 ft./min.

The chain is fitted with tension screws and springs arranged at right angles to the track to exert a predetermined pressure on the chain in the direction of the mine cars. The mine-car rails are mounted on joists extending from the framework of the creeper; this prevents movement of the rails relative to the creeper and therefore maintains the mine cars in contact with the friction pads.

The creeper has proved itself to be most effective, with the motor, gearing, and all moving parts being situated well above floor level and the only moving parts exposed are the friction pads acting on the mine cars.

ACCORDING TO the Bank of London & South America, Limited, authorization for exports of Chilean iron ore, amounting to more than 1,500,000 long tons, has been granted to the mining companies Minera Sante Fe and Minera Cerro Imán in respect of export contracts signed in 1957, 1959, and 1960. Contract prices ranged from $US4.10 to $US8.05 (f.o.b.) a long ton.

In his presidential address to the National Association of Colliery Managers, delivered at the annual meeting in Edinburgh on Tuesday, Mr. Wilson said: "The burden of legislation inevitably falls on the manager. Prior to the war this was already heavy, but over the last decade it has increased to such an extent that doubt must arise as to whether it is within the capacity of a single person to cope adequately with the multiplicity of statutory requirements."

Progress—with Safety

by H. H. WILSON

THIS is the 74th annual general meeting of the National Association of Colliery Managers, and as far as I can recall it is only the second time the annual meeting has been held in Edinburgh. It is a great honour and privilege to occupy the presidential chair on this occasion, even although it is with a considerable measure of trepidation that I attempt to follow my two fellow countrymen who have held this office since the war.

The aims and purpose of the association have been outlined on so many similar occasions that they need not be repeated in this address. Since its beginning the coal-mining industry has passed through many vicissitudes, but the aims of the association are the same today as in those far off days and its need is no less. Indeed, during recent years the work involved in new legislation and legal matters has occupied a large proportion—probably far too large—of the time of both the General Council and branch councils. It is, however, gratifying to record that this necessary function has not detracted in any way from what I consider the more constructive work of the branches in the presentation and discussion by members of technical papers.

We have continued to maintain the closest possible contacts on matters of common interest with the British Association of Colliery Management through the National Liaison Committee. This committee has had its teething troubles, but, like all new babies, it has made progress. Events over the past year, when I have had the privilege of acting as chairman, have shown the need for both bodies to work amicably together if the interests of management are to be effectively served, and I would like to record my appreciation of the guidance and help given by the representatives of both associations, and the valuable assistance and excellent work done on behalf of our more unfortunate members by our technical adviser, Sir Andrew Bryan, when we had occasion to call on his services.

It was my privilege as your president to choose the theme for this conference, and I make no apology for selecting "Safety." I am glad this was readily endorsed by your General Council. Apart from personal interests, having been far too frequently associated with accidents and spent a considerable part of my mining career on this work, I believe that no real progress can be made in this industry without greater safety. Since these conferences have been held on the present scale, "Safety," though as a subject it has not been neglected, has never been the principal theme. No one is more concerned with mining accidents than the colliery manager, and no one except the victim and his immediate relatives suffers as much. It is therefore fitting that this conference should devote its attention to such problems, particularly at a time when an improved accident record could be so vital to the industry as a means of economically conserving manpower and promoting recruitment.

It is fitting that the technical sessions will be supplemented by an exhibition. The exhibits should prove of great interest to all those attending the conference, and our thanks are due to the officers of the Safety in Mines Research Establishment and the National Coal Board, who have been responsible for the organization of this feature.

I have no intention in this address of encroaching on the field of those who so readily agreed to give their time and energy in the preparation of papers for presentation to this conference, and my remarks will be confined to matters which appear to me to be of importance to management in general and colliery managers in particular. Nor do I intend boring you with detailed statistics, which can in any event be very misleading unless details, such as high yearly fluctuations, changes in classification, and other varying factors, are taken into account. Nevertheless, a brief summary of the position as I see it is appropriate at this stage.

Though some progress was made in the years

prior to the war, the accident rates for fatal and non-fatal serious accidents showed no pronounced tendency to decrease, and this position no doubt gave rise to the appointment of the Royal Commission on Mining Accidents which published its report in 1938. Following the war, the position changed, and this was admirably shown by Mr. T. A. Rogers, HM Chief Inspector of Mines, in his presidential address to the Institution of Mining Engineers, when he analysed accident trends over six-year periods in order to iron out any anomalies arising from high yearly fluctuations. Over the two six-year periods 1946-51 and 1952-57 the casualties (fatal and seriously injured) per 100,000 manshifts showed a steady decline from 1.5 to 1.28, representing an improvement of no less than 14.7 per cent. Actually, the equivalent improvement figure for fatalities alone was 21.4 per cent.

This satisfactory progress unfortunately has not been maintained, and the reversal of the improving trend has given rise to considerable concern. From 1957 onwards the combined rate showed a deterioration of over 16 per cent., and while there was a slight improvement in 1960, it was only marginal.

The position is all the more baffling as it follows the introduction of a new Mines and Quarries Act, additional regulations, a substantial increase in the complement of inspectors, NCB directives aimed at improving mining standards in both equipment and working conditions, and increasing activity in the field of experimental research. In addition, every incident of a serious nature is now the subject of more intensive investigation than ever before by HM Inspectors, workmen's inspectors, and the NCB's safety organization. The results are so disappointing that obviously something is wrong. Are our energies being wrongly directed, or is there some vital factor that has been missed? Are we being over regulated and inspected to such an extent that the workmen are subconsciously inclined to think it is some other person's responsibility and not their own to keep themselves safe; has a fundamental change in the method of working, such as mechanization, affected the issue; or has the psychological reaction of a lessening sense of security in the industry over the past three years been a factor? Mental attitudes count for more in mining than in any other industry, and these are some of the questions we should be asking ourselves and will, I hope, be considered at this conference.

Legislation, Accidents, and the Manager

Twelve years ago, Sir Andrew Bryan, in his presidential address to the Institution of Mining Engineers (he was then Chief Inspector of Mines) made a plea for a closer co-ordination of the several inspectorial, advisory, and supervisory services within the industry, expressing the hope that if the various bodies could reconcile their independence and personal loyalties to a common objective it might produce better results. This hope has not been fulfilled, nor has the question been answered, as there is still far too much overlapping of the work of the various bodies concerned. Each appears to have its own purpose to serve and its own loyalties to maintain, leaving the manager without the guidance and assistance that could so easily be achieved by greater unity of purpose and which he has a right to expect.

The burden of legislation inevitably falls on the manager. Prior to the war this was already heavy, but over the last decade it has increased to such an extent that doubt must arise as to whether it is within the capacity of a single person to cope adequately with the multiplicity of statutory requirements, NCB directives, codes of practice, etc., and at the same time effectively carry out his primary function of directing the working of the mine. It may be that in their wisdom the legislators, in preparing the new Mines and Quarries Act, deemed it necessary to place total responsibility on the manager in order to maintain his authority. Desirable though this may have been, they evidently did not realize, or at least failed to appreciate, the extent of the growth of this burden, otherwise more consideration might have been given to the possibility of at least relieving him of some vicarious responsibilities.

Recent events have shown that when a serious incident occurs the colliery involved is subject to a very detailed examination by all parties. While such examinations help in ascertaining the probable causes and assist in determining possible remedial measures, they frequently focus attention on matters not always relevant to the incident, and of which much can be made to cast reflections on management.

Special Safety Audit

Your council has for some time been concerned about this matter and has discussed the various aspects in detail. While not condoning irregularities or bad practices, and being fully alive to the burdens imposed on management by the running of the collieries and the mass of legislation, directives, etc., which has to be implemented, the council feels that a special safety audit should be made at all collieries at such intervals as would provide for the manager a reasonable check on the effectiveness and efficiency of normal inspections and supervision in relation to matters affecting safety.

It is appreciated that the manager cannot evade the responsibility of carrying out all safety requirements, statutory and otherwise, but it is abundantly clear that if effective assistance in some form is provided he can at least be relieved to a considerable extent by the knowledge that details are being attended to and his attention directed to any irregularities (or bad practices), no matter how trivial. I believe this can best be accomplished by an efficient safety organization.

From its inception, the National Coal Board has provided a safety organization throughout the coalfields on a scale previously confined to a few of the more progressive colliery undertakings. Considerable money has also been spent on research, etc., and there has never been any hesitancy about expenditure on issues relating to safety. A great

deal of valuable work has been accomplished by the Safety Branch, but if we judge by results some doubt must exist if it is geared to present day circumstances.

Though there are some exceptions, it is doubtful if the Safety Branch has been generally recognized as the important integral unit in the production organization that it should be. In consequence, there has been a tendency to recruit for safety work personnel who were unsuited for what might be considered more onerous duties. It may be that for many years the field of recruitment was limited, but this is a post calling for mining ability, personality and courage, enthusiasm, and above all a dedication to safety work in the firm belief that accidents can be prevented. Progress will only be accelerated when this is fully recognized and greater discernment exercised in selection of personnel. While this applies to most levels, it is more apposite to pit safety officers, where the standard has not always been as high as it should be, and improvement in this direction would pay dividends. It is moreover on this officer that the manager should be relying and from whom he can obtain the service he requires.

The National Coal Board has evidently been alive to this need and agreed to the appointment of additional officers at selected collieries throughout the coalfields. These have a higher status than the normal pit safety officer and are devoting their full time to accident prevention. Preliminary indications are that this experiment is proving worth while.

Safety and Future Developments

We are all very conscious of the difficulties in our industry at the present time and the strenuous efforts of the national chairman and his board, in the face of great difficulties, to maintain it as the live undertaking we believe it should be in the best interests of our country. Mr. Robens, in his various speeches, has made a declaration of faith in the industry, and indicated that if certain necessary measures are taken and successfully applied there is no need for despondency. This is so closely integrated with the mechanization drive to obtain the higher productivity so urgently necessary that a paragraph in the recent joint letter on "Plans for Increased Mechanization," issued on behalf of the NCB and the NUM, is not without significance. I quote:—

"The board and the union agree that in implementing this programme special care will be taken to ensure the best safety and health conditions. Problems arising will be dealt with through existing machinery with the greatest possible speed."

It would be tragic if the mechanization drive were retarded because of failure to overcome hazards arising from the use of new equipment. Most mining developments, if not presenting entirely new problems, frequently aggravate old ones, the questions of support and the formation of dust associated with certain power-loading machines being examples. It is not enough to wait until a hazard makes itself manifest. There must be a greater measure of anticipation of such problems, during the development stage, so that attention can be directed towards a solution. There is also a need for legislation keeping pace with developments, and endeavours should be made to avoid the rather unsatisfactory situation as at present of over 40 per cent. of the output being produced under exemption from existing regulations.

Finally, though safety can generally be related to mining standards, and it should not be forgotten that the basic purpose of legislation, directives, etc., is to establish and enforce an acceptable minimum, the prevention of accidents cannot be divorced from individual responsibility, and the human factor, imponderable though it may be, remains the most important.

Many years ago I had the privilege of being associated with the scheme inaugurated by the Fife Coal Company, and I well remember the frustration and the difficulties encountered when those responsible were criticized even to the point of ridicule. But they won through, and met with such success that the legacy they left of a low accident rate has extended over many years. I am of the opinion that the basic reason for this was simply that the higher management of the company believed absolutely that accidents could be prevented, and, what is more important, was successful in getting this view right down the line of management even to the workmen. In simple words, they managed to create a "safety awareness" to the extent that every person was literally his own safety engineer.

If this conference does no more than inspire the delegates to similar activities, and results in the prevention of even one mining incident, then all the organization and work involved will not have been in vain.

World Mineral Production

A WEALTH of information is contained in the "Statistical Summary of the Mineral Industry (World Production, Exports, and Imports)" issued annually by the Mineral Resources Division, Oversea Geological Surveys, from the Statistical Section, 64-78, Gray's Inn Road, London, W.C.1, and published by the Stationery Office, price 27s. 6d.

Nearly 60 minerals are listed in the issue recently published covering the six years, 1954 to 1959. They include (in alphabetical order):—Aluminium (including bauxite and cryolite); chrome ore and chromium; coal, coke, and by-products; cobalt; fluorspar; graphite; pig-iron and steel ingots; magnesite and dolomite; manganese; molybdenum; nickel; tantalum and niobium minerals; tin; titanium minerals; uranium minerals; vanadium; zinc; zirconium, and certain other minerals and metals.

A section deals with minerals produced in countries of the British Commonwealth. Statistics relating to germanium are included for the first time. Although the "Statistical Summary" attempts to provide a comprehensive world coverage, complete information is not obtainable from every country. Nevertheless, the almost 400 pages of statistics will be found to meet the needs of most inquirers.

Stainless Steel Firebars

USE of stainless steel firebars in sinter plant and other applications where extremes of heat and abrasion have to be countered is increasing, both at home and abroad. A good example of this is the Royal Dutch Blast Furnaces & Steel Works at Ijmuiden where over 20,000 stainless steel firebars are in use. These bars are made of Firth-Vickers "Vesuvius," a high-chromium type of heat-resisting steel which has been developed for use at high temperatures and which has excellent resistance to scaling at temperatures up to 1,150 deg. C. It is free from "growth" which often occurs in cast iron with repeated heating and cooling and is also resistant to abrasion.

Sintering plants are now widely used in connection with blast furnaces to convert the "fines" from the lower grade iron ores into a useable form. "Vesuvius" steel has proved extremely economic in this application and the average life of firebars in these plants has been increased from 80 days' to over 1,800 days' continuous service.

"Vesuvius" has also been found particularly suitable for furnace constructions of many kinds, as in the cement industry where the conditions of service in kilns are extremely arduous. "Vesuvius" nose ring castings under extremes of heat and abrasion have been found to give a very great increase in the length of life. Further advantage is gained because the kiln is able to maintain production without being closed down so often, thus increasing output and reducing maintenance costs. Operating in conjunction with rotary kilns are coolers which reduce the temperature of the cement-clinker leaving the kilns from about 1,200 to 300 deg. C., at the same time pre-heating the air for combustion. In the region of the greatest heat and abrasion in these coolers, "Vesuvius" steel castings are used for the lifters which cascade the hot cement-clinker through the air stream.

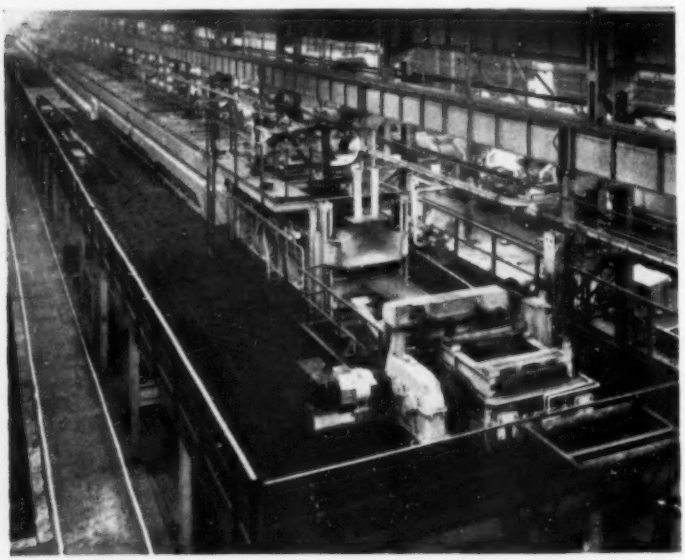
Spiral flights made at castings in "Vesuvius" steel are used in the glass industry for feeding raw materials to the furnaces. The flights are cast in two parts making a spiral, and give very satisfactory service under extremely hot and abrasive conditions. This type of casting has also been used with success in the cement industry.

Other applications for "Vesuvius" castings have been found where high temperatures are met in the widest variety of furnaces, boilers, and superheaters also in domestic fire grates and boiler grates, and in the manufacture of pumps where resistance to abrasive slurry is required.

DECARBURIZING LINE

THE General Electric Company, Limited, has supplied to Richard Thomas & Baldwins, Limited, a number of electric furnaces for the processing of Alphasil, a silicon steel of the grain-orientated type used in the construction of cores for transformers and reactors. The furnaces are installed in the company's Cookley Works at Brierley Hill, and comprise a continuous strip decarburizing furnace, a continuous strip inter-annealing furnace, and a number of bell-type furnaces for high-temperature annealing.

Including the cooling chambers, the decarburizing furnace is nearly 400 ft. long and is believed to be the longest of its type in Europe. It is of the roller-hearth type and receives steel strip up to 32 in. wide. Having a maximum electrical rating of 1,700 kW, it operates with a controlled atmosphere. The inter-annealing furnace is of similar design to this furnace, but its maximum electrical rating is 2,000 kW.



GEC 2,000-kW Continuous-strip Inter-annealing Furnace, Viewed from the Entry End. Supplied to Richard Thomas & Baldwins, Limited, it is Over 350 ft. Long.

The World Bank has approved a loan equivalent to $22,000,000 to the State Railway of Thailand to assist in the execution of a six-year programme of modernization. The programme will increase the capacity of the railways, improve operating efficiency and reduce operating costs, mainly through the addition of more diesel locomotives.

In this paper, translated from Stahl und Eisen, 80, 19, September 15, 1960, pp. 1268-1274, the author, F. Bartu, reviews the production rates of modern open-hearth furnaces for various practices including oxygen for combustion. He then compares theoretically the combustion of the fuel with cold oxygen and with preheated air and discusses the use of multiple burners. The use of Maerz-Boelens segmental construction for reducing repair times and methods of increasing furnace capacity are then considered. It is concluded that the open-hearth process is far from obsolete.

DESIGN and OPERATION of OPEN-HEARTH FURNACES

THE early demise of the open-hearth furnace has frequently been prognosticated in recent years. It appears, however, that its will to survive is far stronger than has been assumed and harsh criticism has contributed greatly towards improving the design and working of open-hearth furnaces.

Hourly Output

In recent years, a number of publications have appeared on the economy of new or improved steel production methods, in which there are frequent comparisons with open-hearth steel production. In most cases, working values are used which are far below the outputs possible in more modern steelworks. Fig. 1 shows, at the bottom, furnace output values, which are based on economic calculations of this type. The broken line has been plotted from these individual values. It is clear that an analysis starting on the basis of unsatisfactory outputs must deliberately lead to an incorrect and frequently negative estimate of the open-hearth furnace. In planning new steelworks, however, we should start only from working results which have been obtained with new and well-run furnaces.

In Fig. 1 a new curve is given for the outputs, on the basis of mean values for a recently installed furnace. The production, in tons of raw steel per hour, is plotted against the weight of the melt. The black spots (●) indicate furnaces with a solid charge, the open circles (o) furnaces with a proportion of from 20 to 30 per cent. liquid pig-iron. In individual cases, sometimes a few cubic metres of oxygen were blown in with lances during the preliminary boil. The mean oxygen volumes are shown in Fig. 1 in Nm^3/ton steel. The remaining output figures were obtained without using oxygen.

Unfortunately, the majority of the open-hearth furnaces constructed in recent years are located in old steelworks and, not infrequently, the furnace output is reduced by inadequate transport conditions. For future planning purposes and in comparisons between open-hearth steelmaking and other methods, we shall therefore require to use at least the values of the upper curve in Fig. 1 as a basis, and if 10Nm^3 oxygen is used, 15 per cent. higher outputs. We shall then also arrive at substantially more favourable depreciation values for open-hearth furnaces.

The increased use of oxygen and the most recent development of furnace techniques raise expectations of outputs far beyond the values of the upper curve in Fig. 1. In the figure, peak outputs of known open-hearth furnaces have therefore been included, not for the purpose of deriving firm mean values therefrom, but in order to show how wrongly the open-hearth furnace has been evaluated on many occasions, and at what outputs it can in actual fact be operated. The peak values

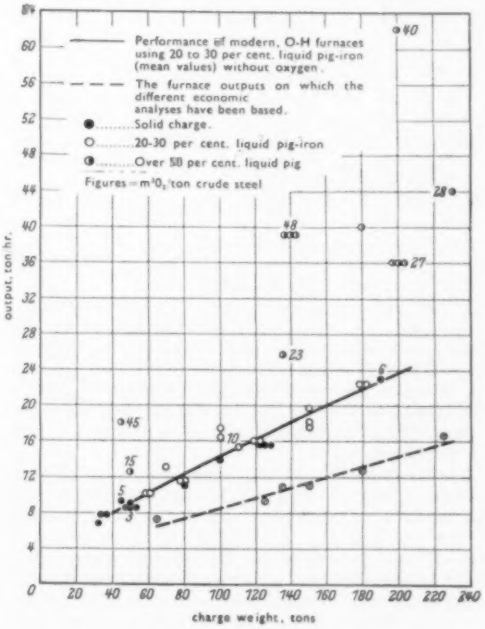


FIG. 1.—HOURLY PRODUCTION OF OPEN-HEARTH FURNACES.

given are not, as it were, record melts, but entirely average values over fairly long periods. The objection that in a number of these furnaces greater volumes of oxygen are used can in no way affect the reality of the outputs attained and can at most be a question of method, *i.e.*, the manner of working the furnace.

These furnaces are worked with 50 to 70 per cent. hot metal. In addition to the output, the low fuel consumption of these furnaces is remarkable. The three 140-ton furnaces, with an average hourly output of 30 tons, have, as a monthly average, a heat consumption of 293,000 kcal/ton. In the 200-ton tilting furnace, with an average output of 37 ton/hr., with 70 per cent. hot metal, and an oxygen addition of 27Nm³/ton, the heat consumption is 420,000 kcal/ton. In a series of melts with 41Nm³/ton oxygen, an output of 62 ton/hr. was attained and a heat consumption of only 115,000 kcal/ton. The record melt, over a period of 2 hr. 40 min., calculated between two successive tappings, was 75 tons steel/hr., with a heat consumption of 108,000 kcal/ton.

The hourly output of a 180-ton Maerz furnace, which is heated with coke-furnace gas, deserves consideration: with a charge of 60 per cent. hot metal without the use of oxygen, it produces 40 tons steel/hr. The heat consumption amounts to about 600,000 kcal/ton. Also, the oil-fired 70-ton Maerz furnace with a mean output of 13 ton/hr. with 30 per cent. hot metal is operated without oxygen.

It will be objected that in the cases enumerated, the working conditions were very favourable, charging proceeded more rapidly than usual, there was no waiting for a free soaking pit, that the heat supply was very high, that the melt started with the right carbon content, that sufficient compressed air or steam was available for atomizing, that an adequate draught was available, that very good furnacemen were available and the like. But what has been done to create these optimum conditions? In many steelworks, unfortunately, far too little. We require to investigate the conditions under which very good melts are attained and, on the basis of the optimum values thus determined, draw up a timetable by which the melter should be guided in running the furnaces.

In many cases, the outgoings for improving furnace operation are not correctly estimated. If these investment costs are converted to the increased annual production, it will be found surprising how low they are per ton of increased annual output and it will be further found that they are a very small proportion of the investment costs for new equipment.

The adaptability of the open-hearth furnace to varying charging and operating conditions has always been considered to be the great advantage of the process. It is, in fact, particularly useful, in each case depending on the state of the market, to be able to process different grades and proportions of pig-iron and scrap in one and the same furnace. This flexibility, is at the same time the greatest disadvantage of the open-hearth furnace, since it also adapts itself to a lower production rate as the running of the furnace does not, for instance, as in the converter, determine the working cycle. We should in no circumstances, therefore, estimate the efficiency of an open-hearth furnace on the basis of restricted working conditions.

The next aim of open-hearth furnace technique should be, using larger units and charging hot metal, to attain four melts per day, *i.e.*, a melting period of 6 hr. between successive tappings. So many favourable melt results are available, however, that in the not far distant future, even in large furnaces, and with bigger hot metal charges, it should be possible to reckon on a melting period of from 4 to 5 hr. This aim will only be achieved, however, if all the operational bottlenecks which restrict the output of furnaces are eliminated.

Combustion in the Open-hearth Furnace with and without Oxygen

The addition of oxygen for combustion purposes always results in acceleration of the melting process. In the hearth space, greater quantities of heat per time unit are transferred to the charge than when operating without oxygen. What conclusions can be drawn from the processes with the use of oxygen for the building and working of the furnace, particularly for the classical method of heating with a fuel and regeneratively preheated air? The analysis will only cover furnaces which are heated with cold gas or liquid fuels: the conclusions reached should not necessarily be assumed to apply to producer-gas-fired furnaces.

In the first instance, we shall investigate the manner in which, for a given quantity of fuel, the heat availability in the furnace space changes with the application of oxygen boost. "Heat availability in the furnace" can be defined as that quantity of heat which is available in the furnace space, above the temperature of the charge, either in the flame, or in the combustion products. Charge temperature fluctuates widely and is lower while melting down than when finishing the melt. In the following text, a mean working temperature, $t_A = 1{,}600$ deg. C. is used.

Combustion in atmospheric air is the hitherto usual and familiar form of heating; combustion with oxygen is a new method. There is a tendency, consequently, to start from air combustion and seek to find the changes or modifications introduced by using oxygen. It is more advantageous, however, when investigating this problem, to reverse the procedure and start with consideration of the heating conditions, using pure, cold oxygen. When, then, passing the consideration of combustion conditions with preheated air, it is only necessary to add the corresponding nitrogen proportion and the additional quantities of latent heat.

Fig. 2 illustrates the combustion of a cold (0 deg. C.) fuel with cold (0 deg. C.) pure oxygen. The products of quantity by specific heat, for the fuel, oxygen or combustion air and combustion products are laid off as distances along the axis of the abscissae, while the temperatures are plotted as ordinates. This, purely, diagrammatic, and not necessarily precise, chart shows the quantities

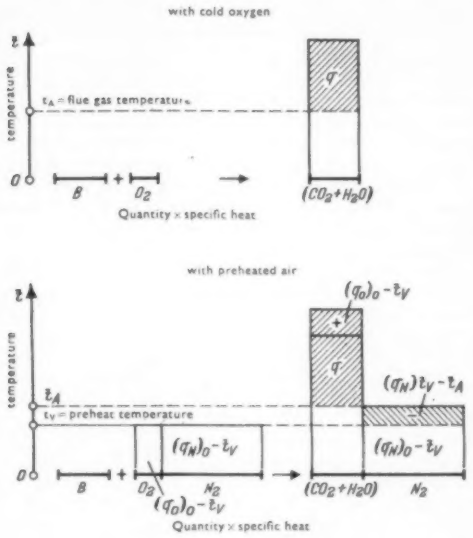


FIG. 2.—COMPARISON OF COMBUSTION WITH COLD OXYGEN AND PREHEATED AIR.

of heat as areas. The quantity of fuel *B* burns with the quantity of oxygen O_2 to form a volume of combustion products (CO_2+H_2O) and liberates a certain quantity of heat, represented by the area of the rectangle on the right-hand side of the equation. Of this quantity of heat, only the shaded, upper part q can be used in the open-hearth furnace as effective heat, since only this part is hotter than the flue-gas temperature (t_A).

The processes in combustion with preheated air are shown in the lower half of the diagram. To the oxygen volume O_2, the nitrogen volume N_2 is now added. Further, the left-hand half of the equation now contains the heat contents of the preheated oxygen and the preheated nitrogen. On the right-hand side, the volume of combustion gases (CO_2+H_2O) and their heat content remain unchanged. To the heat content of the combustion gases must be added the heat content of the preheated oxygen at the preheat temperature t_V, designated by $(q_O)_O$-t_V. On the right, however, the quantity of heat must be deducted which is necessary to heat the inert nitrogen from the temperature of the air preheat t_V to the flue-gas temperature t_A since the nitrogen leaves the furnace space at a higher temperature than it enters. If now the heat content of the preheated oxygen $(q_O)_O$-t_V is just sufficient to cover the preheating of the nitrogen from t_V to t_A, the quantity of heat liberated into the furnace space by combustion in preheated air will be the same as in the case of combustion in pure, cold oxygen. This condition is fulfilled by the following equation:

$$1 \times (c_O)_{O-t_V} \cdot t_V = 3{,}76\ (c_N)_{t_V-t_A} \cdot (t_A - t_V)$$

The term $(c_O)_O$-t_V represents the mean, specific heat of the oxygen between O and $t_V O$; the term $(c_N)_{t_V t}$ t_A is the mean specific heat of the nitrogen between the temperatures t_V and t_A. With a flue-gas temperature of $t_A = 1{,}600$ deg. C., the above equation furnishes for the required air-preheat temperature t_V a value of 1,270 deg. C.

This result shows that a working temperature of $t_A = 1{,}600$ deg. C., combustion in pure oxygen does not supply any more heat to the furnace space than combustion in air preheated to 1,270 deg. C. In fact, if the air-preheat is raised above 1,270 deg. C., or the working temperature falls below 1,600 deg. C., as, for instance, during melting down, combustion in preheated air will even supply a greater quantity of heat per fuel calorie than if pure oxygen is used. Increasing the air-preheat temperature above 1,270 deg. C. enables even more heat to be introduced into the furnace space, for the same quantity of fuel than the use of oxygen. Our knowledge of the effects of high air-preheat has hitherto been based on theoretical considerations and on difficultly-comparable, isolated tests; the conclusions to be drawn from the use of oxygen, on the other hand, clearly show the great influence of the preheating temperature on the smelting performance of an open-hearth furnace.

Methods of Using Oxygen for Combustion

The admixture of oxygen with combustion air in front of the combustion chamber does not, as numerous experiments have demonstrated, bring such a great advantage as the introduction of oxygen into the furnace space. If the air is oxygen-enriched before combustion, however, the availability of useful heat is modified in the same manner as when oxygen is directly introduced into the furnace space. The combustion temperature also rises in the same measure, but the rise in temperature is distributed over the whole length of the flame. When oxygen is blown into the furnace space, consequently, the other factors in the heat transfer, in particular the heat-transfer from the flame to the charge, must become considerably improved. It now becomes necessary, therefore, to examine the effect on the flow conditions in the furnace of the introduction of an oxygen jet into the flame.

The influence of an oxygen jet on the gas flow in the furnace is determined by the ratio of the momentum of the cold oxygen to that of the flame when burning with preheated air alone. When oxygen flows in considerable volume at a critical velocity into the furnace space, its kinetic energy can considerably influence the character of the flame and in particular, its shape and behaviour. The flame becomes shorter which appears to be an important factor in improving performance. Except in a few cases, it has not been reported that shortening of the flame unfavourably influences the development of the metallurgical reactions. It may, therefore, be assumed that the usual flame in an open-hearth furnace is too long and that a shorter and hotter flame should be aimed at, *e.g.*, by increasing the energy of emission.

Very smooth-running furnaces, worked with-

out oxygen, always have short, compact flames; in such furnaces, the addition of an oxygen blast for the same quantity of fuel, since it does not accelerate the metallurgical reactions, does not produce the same improvement in performance as in the case of furnaces with longer flames and slacker running conditions. This signifies that, in the case of modern, properly-run furnaces, a part of the improvement in performance attainable by the addition of oxygen in furnaces with slacker running conditions is already anticipated; and that it ought to be possible, with stricter observance of advanced principles of construction and operation, to control the flame in a manner which has hitherto only been possible with the help of an oxygen blast.

The oxygen blast increases the total momentum of the flame, which becomes more steady, strikes the charge at a higher velocity and increases heat transfer by convection. In the literature, it is again and again asserted that in the open-hearth furnace by far the greater part of the heat is transmitted by radiation and only a small fraction by convection. This view may correctly reflect the conditions in existing furnaces, but cannot constitute a principle of open-hearth furnace operation. We are, on the contrary, of the opinion that convective heat transmission in the open-hearth furnace must be further, considerably intensified, especially during particular periods of the run and that thereby considerable further improvement in the performance of the furnace is attainable, even without resorting to the oxygen boost.

There are various structural and operational means for increasing the momentum of the flame which will not be further discussed here. It is in any case wrong to use oil burners, in which the greater part of the energy of the compressed air or steam is already expended in the burner itself, for atomizing the fuel. It is most certainly disadvantageous to fail to utilize the momentum of the combustion air flow to increase the total momentum of the flame.

A further important result of adding oxygen is the change in the air consumption and the volume of flue gases. A furnace with a restricted air supply can be more intensively heated by adding oxygen. The resulting improvement in performance is not, however, a consequence of using oxygen boost for the combustion of the fuel, but merely an indication of existing defects in the air supply or the construction of the furnace; these defects being made good, however, in a somewhat expensive way, at the cost of the added oxygen. Increasing the blower power, or the provision of an additional blower would always be more economical. It is true that the existence of a deficiency in the air supply and the disadvantageous effect thereof must first be realized and recognized, which is not always easily possible, particularly if a high proportion of hot metal is being used in the charge. Frequently, the deficiency in the air supply is only recognizable indirectly, when an oxygen boost is applied. Insufficient attention is often paid to the additional air required for refining and the combustion of the carbon monoxide formed thereby.

Similar considerations apply on the flue-gas side. When a part of the combustion air is replaced by oxygen, the volume of flue gases diminishes. With defective draughting conditions, it is then possible to burn more fuel in the furnace, obtaining an increased performance. In this case, likewise, the beneficial effect of the oxygen boost is merely indicative of an originally inefficient furnace.

New furnace installations can be designed and built in such a way that there will be neither a shortage of combustion air nor a deficiency in the draught.

The use of oxygen boost to cure either deficiency will then become superfluous. It is then necessary, however, to make provision for burning large quantities of fuel and correspondingly large volumes of combustion air, completely and with a short flame, without the use of oxygen. A low combustion rate in the furnace will always produce a short flame which lengthens as the quantity of fuel is increased, until the length of the flame finally limits the combustion rate. In order to obtain such short flames as with oxygen boost, the momentum of the flame must be increased; and, if necessary, the fuel distributed among a number of burners.

Multiple Burners

Various suggestions to this effect have been made recently. A proposal by E. Boelens can be very simply applied to the Maerz-Boelens furnace.[1] The furnace is equipped with three burners: one in the end wall and two in the side walls (Fig. 3).

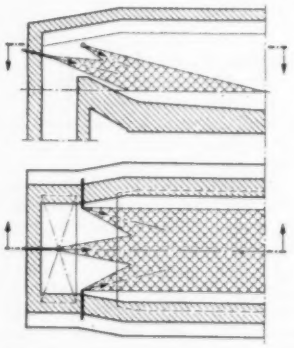


FIG. 3.—ARRANGEMENT OF SIDE BURNERS IN MAERZ-BOELENS FURNACE.

The side ports are set much higher than in the usual arrangements of this kind and strike down fairly steeply on the bath. In plan view, they are set at an angle to the furnace axis and not parallel to it, so that the outer edges of the flame cones are approximately parallel to the front or rear wall (Fig. 3, below). This keeps the flame away from the furnace walls. The flame of only one end-wall burner spreads fanwise on striking the bath surface. Flame tips or hot combustion gases always tend to rise along the walls towards the arch. If two side ports are now used, acting

contrary to this tendency, better protection of the furnace brickwork can be certainly expected.

During charging and melting-down, the furnace is worked with all three ports, during the finishing boil with the two side burners only. The flames from these burners lie closer to the bath surface and, owing to their steeper angle of incidence, also improve the heat transfer by convection. The side ports are in the upper part of the walls, which are set well back, owing to the curvature, and are there least exposed to wear and tear. Owing to the curvature of the walls, the burners require to project only slightly into the furnace space and do not interfere with the changing of the wall segments, while the arch remains quite undisturbed.

This distribution of the fuel in three jets shortens the flame, improves convective heat transfer, and ensures that the charge is thoroughly surrounded by the flames. Heating can be intensified without overstressing the brickwork. With such high-placed side ports, E. Boelens has in his 32-ton Maerz-Boelens furnaces, working on solid charges, with an average, hourly capacity of 6.2 tons, already attained 937 and 950 successive melts before renewing the basic rear wall and the silica arch, respectively.

Oxygen for Refining

The comparison between combustion with pure, cold oxygen, and preheated air can in the same manner be applied to the refining process. It can be deduced from Fig. 2 that equal quantities of heat are made available in the upper part of the furnace whether pure cold oxygen or pre-heated air are used. Refining is also a combustion process, it being immaterial for the purposes of this comparison whether the elements in the iron, such as carbon or silicon, are oxidized directly or through the intermediary of the ferrous oxide. The quantities of heat liberated in the oxidation of carbon or silicon must be the same, whether the process is conducted with pure oxygen or with superheated air. Since a highly-exothermal, refining reaction is induced in the bath, whether by blowing-in oxygen or by intensifying the air blast, it should essentially be possible to obtain equally rapid refining by the use of superheated air.

The fundamental difference consists in the manner in which the necessary oxygen is introduced into the bath; since, when refining with pure oxygen, this latter is blown on or into the melt with a high velocity. For rapid refining with a dilute oxidizing agent such as air, a very effective "convective" transfer of the oxygen over the largest possible area of the bath surface is essential. The flame must have a correspondingly high momentum and be highly oxidizing. Since, in the open-hearth furnace, both heat and flame oxygen are transmitted to the bath by convection, any increase in the flame momentum necessarily increases the intensity of heating and, consequently, the rate of oxidation. The two processes develop simultaneously and both act to raise the bath temperature and thus accelerate the reaction of the refining ore with the impurities of the iron. Under these conditions, from about 1.5 to 1.6 per cent. C., decarburizing rates of the order of 1.2 per cent. C. per hr. can be attained without the development of brown fume.

Segmental Construction as a Means of Improving Furnace Performance

With increased hourly output figures, the furnace runs become shorter, even if furnace life, measured in number of heats, does not decrease. The furnaces must be more frequently fettled and the annual idle periods must therefore increase. The degree of utilization (performance) of the furnace, consequently falls. A part of the additional output gained during the working runs is lost in the more frequent stoppages for fettling. Fig. 4 shows how

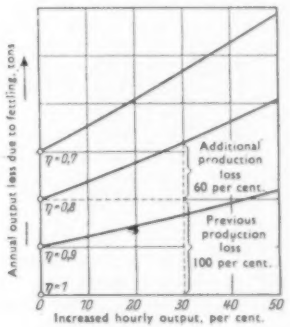


FIG. 4.—ANNUAL OUTPUT LOSS DUE TO FETTLING IN RELATION TO INCREASING OUTPUT RATE. (NUMBER OF HEATS AND DURATION OF FETTLING PERIODS PER FURNACE RUN UNCHANGED.)

the annual loss of output during fettling increases with rising hourly output. The percentage increase of the hourly output is plotted on the axis of the abscissae, starting from the original hourly output as zero. The ordinates represent the quantities of steel not produced during the fettling period.

The ordinate through the origin (zero) shows the loss of output with furnace utilization percentages η of 70, 80, and 90 per cent., respectively. As the hourly output rises, the percentage utilization of the furnace falls and the quantities of steel missing during the fettling periods increase appreciably. The figure shows as an example the increased loss of output, starting from a furnace availability factor of $\eta = 80$ per cent. For a 30 per cent. higher, hourly output, the annual loss of output increases by about 60 per cent. The curve has been plotted on the assumption that the number of heats per furnace run remains the same, even when the hourly output is increased—which usually, will hardly be possible. The values given in Fig. 4 for lost output will, consequently, in practice be even higher than stated. Consequently, in the case of high-duty furnaces, the greatest attention must

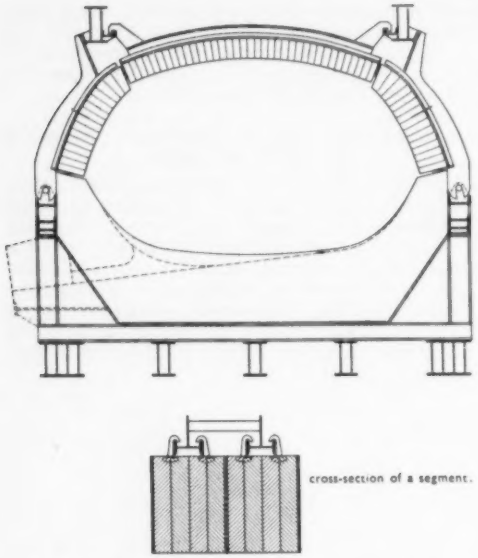


FIG. 5.—MAERZ-BOELENS FURNACE WITH REMOVABLE ROOF AND WALL SEGMENTS.

be paid to rapid fettling, and the shortest possible repair times. These requirements were fundamental for the further development of the Maerz-Boelens furnace.

In the case of the Maerz-Boelens furnaces in Dortmund and Hoerde, on which C. Pottgiesser, H. Därmann, E. Knackstedt[2], and H. J. Krabielle[3] have reported the furnace arch consists of separate, interchangeable brickwork courses, while the walls are laid in place, brick by brick. In the new, Maerz-Boelens furnaces, on the other hand, the front and rear walls are also made of ready-assembled segments, thus approaching the ideal of a " prefabricated " furnace.

Fig. 5 shows the cross-section of such a segment, for the arch and side walls. On transverse I-joists, assemblies of four each, sheet-metal cased, chromite-magnesite bricks with pressed-in, strip stirrups are suspended. The flange of the joist simultaneously supports the suspended bricks, thus ensuring the good support of the bricks by the reinforcement, essential for handling the segments. In order to increase the resisting moment of the I-section, the web has a reinforcing rib, simultaneously acting as a cooling fin, preventing overheating or warping of the I-joist even when the brickwork is seriously worn.

The I-joists are rigidly connected in pairs, forming a segment of eight bricks with a total of 740 mm. (2 ft. 6 in.) width. The bricks have a depth in the arch of 375 mm. (14¾ in.) and in the side walls of 500 mm. (1 ft. 8 in.).

Fig. 5 also shows both arch and wall segments in the cross-section of the furnace. The arch segments are suspended from the upper, reinforcing framework. Only one shape of brick is required, since the end bricks of each arch ring are supported by simple, interchangeable abutment plates. In order to take up the expansion of the bricks during heating up and the subsequent accumulation of ferrous oxide, corrugated-iron strips are laid in the butt and bearing joints, as shown, for example, in the cross-section of a segment. Asbestos sheets between the individual segments prevent the bricks of adjacent such segments from becoming sintered together. The individual segments can be lifted out without damaging the bricks of the neighbouring segments and replaced by new segments.

Contrary to previous practice, the wall linings also require only one shape of brick. One further shape each is required for the transition between side walls and arch and for the port lintels, respectively, which also consist of interchangeable courses. At the bottom end of each wall segment, there is a bearing plate with a second at half-height, in order that the bottom bricks shall not have to carry the whole weight of the wall.

As in the case of the arch brickwork, the I-joists of the wall linings are reinforced by welded, plate ribs. These stiffening ribs also carry the special bearing plates for the wall segments. The lower ends of the stiffening ribs are rotatably mounted on pins, the upper ends rest against the top reinforcing frame. When fitting in place, the prefabricated segment is first hung on the lower pins or trunnions, when lifting out, it is rotated about these trunnions.

In designing such wall segments, attention must also be paid to the rise of the hearth and the masonry foundations, underneath the wall elements, since the wall segments must not be allowed to press upwards, against the arch. The wall segment is consequently made to bear at the top with a flat end face parallel to the parting line, against the reinforcing frame. When the segment is lifted out, its top endface slides on the frame and the top brickwork lining of the wall remains in the same plane, whatever the displacement.

The segmental form of construction facilitates and shortens quite considerably the fettling time needed for the new, Maerz-Boelens furnace. Inter-heat repairs to the walls and arch can also be carried out quickly and without heavy, manual labour. Any required segment can be rapidly removed and replaced by a new one. The changing of nine, rear-wall segments over a total length of nearly seven metres (23 ft.) took only 3 hr., the first time it was done. During all this time, the furnace remained at working heat. The segments for inter-heat repairs are suitably made with shorter bricks in order not to project excessively beyond the brickwork remaining in place. Segments removed can often be patched and re-used for repairs. The lifting out and removal of the segments requires only a crane or an electric hoist. The arch segment for a 250-ton furnace weighs no more than 4 tons, a wall segment a maximum of 2½ tons.

Segmental construction has been applied in a different form for the lining of acid furnaces, *i.e.*, furnaces with an acid hearth, silica walls and silica arch, at the suggestion of SKF Hellefors (A.B.

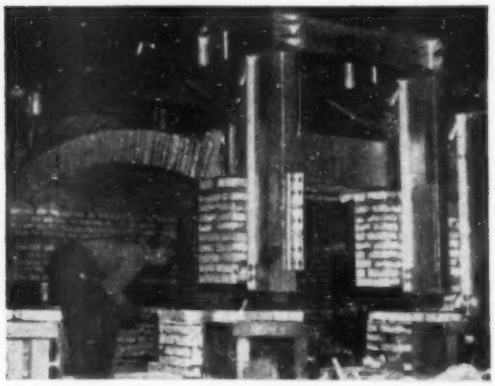


FIG. 6.—SEGMENTAL CONSTRUCTION FOR AN ACID O-H FURNACE.

Svenska Kullagerfabriken). In this case, the walls and arch are not built up from separate courses, but the whole lining of the hearth space, including the furnace reinforcement, is divided by vertical parting planes into five sections. Fig. 6 shows one such section being fitted in place during relining of the furnace. The section is assembled in the brick shed and represents a prefabricated component, which is directly fitted in place in the furnace steelwork. Segmental construction was selected for this acid furnace to reduce the amount of fettling work and limit it to the fitting of a few components; and not in order to be able to execute interheat repairs more quickly.

This form of segmental construction is only applicable to acid-lined furnaces with walls and arches of silica brick, since in such furnaces, the arch and the walls wear down at about the same rate, and interheat repairs such as occur in basic-lined furnaces, are less likely to be required. Since the capacity of acid-lined furnaces is restricted, the weight of such furnace lining sections remains within practicable limits. In the case of basic furnaces, in which partial patching, particularly of the walls, is usually necessary, and in which relining is usually far more difficult owing to the higher density (*i.e.*, weight) of the basic bricks, this form of segmental construction cannot be used. Large furnaces are in any case out of the question, in view of the excessive weight of the required segments.

Increased Furnace Performance

If, by more intensive heating and the use of oxygen, the furnace rate is continuously increased, there comes a time when the melting times can only be further accelerated by applying different, more costly techniques. If, at the same time, the optimum degree of utilization of the furnace has already been reached, it is only possible further to increase output by increasing the weight of the charge. It then becomes necessary to use all possible means for accommodating a furnace of larger capacity in the same space.

It has repeatedly been demonstrated on actual examples how, by rebuilding with more compact burners and ports, valuable space can be gained for increasing the capacity of the hearth. Fig. 7 shows in longitudinal section the lengthening of the hearth of a 200-ton furnace of American design, by conversion to ports of the Maerz type. The gain amounted to 4 m. (13 ft. 2 in.), or 28.5 per cent. of the original length of the hearth. If the cross-sectional form of the furnace is modified, it is also possible to make the hearth wider, without increasing the width of the furnace superstructure. According to Fig. 7, the hearth has been made 0.8 m. (1 ft. 7½ in.) wider, or 16 per cent. more than the original width. Reconstruction of the ports and the modification of the cross-section have thus together increased the hearth area by about 50 per cent., making possible a corresponding increase in the charge weight and greatly improving the performance of the furnace.

If the charge weight is so considerably increased, it will in all cases be necessary to teem into two ladles—a solution which has hitherto presented difficulties for many steelmakers. The new solution offered by the Maerz-Romiti[4] pouring lip should, however, dispel any doubts or fears on this score.

The above remarks are intended to controvert the various negative opinions expressed on the subject of open-hearth furnaces and to prove that this furnace is far from being obsolete. It is true that, for decades, its development has been slow; the improvements which have so rapidly been introduced during recent years and those still to be expected should not, however, be overlooked.

Summary and Conclusions

The production of open-hearth steel has, in the last few years, made great progress, of which, however, insufficient notice has been taken in examining the economics of the question. Consequently, we have here presented details of the hourly outputs of modern furnaces, using 20 to 30 per cent. pig-iron in the charge, and discussed the results ob-

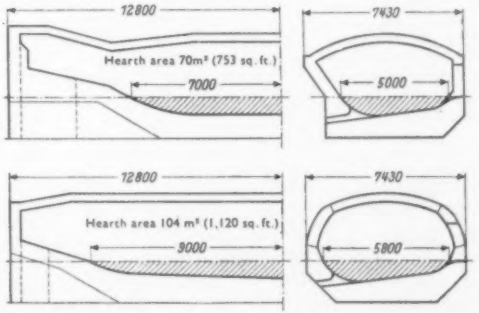


FIG. 7.—INCREASED SPACE IN A 200-TON FURNACE BY REBUILDING WITH MAERZ PORTS AND MAERZ-BOELENS DESIGN.

tained with new-style, high-duty furnaces, worked with a high percentage of pig and an oxygen blast. The prerequisite for high, hourly performance is the elimination of all limitations in regard to transport and conveying means in the supply of fuel and air, and in the removal of the flue gases.

Combustion in oxygen does not increase the quantity of available heat over the hearth, but only improves the heat-transfer conditions; and thus furnishes valuable indications for the further development of the classical form of heating with preheated air. Frequently, the addition of an oxygen boost merely mitigates existing defects in the furnace, which could equally well be dealt with by other and cheaper means. For instance, hotter and shorter flames could also be obtained by increasing the momentum or subdividing the fuel supply between several burners. The use of three burners in a furnace of the Maerz-Boelens type is described.

The higher the hourly output of an open-hearth furnace, the more frequent are the necessary fettling periods whereby a part of the increased production attained is again lost. The construction of the walls and arch of a Maerz-Boelens furnace with the help of prefabricated and interchangeable segments of brickwork enables stoppages to be shortened and increases the period of availability of the furnace. In furnaces for the acid process, these segments can be particularly large, forming entire components of the front wall, rear wall, and arch.

Increasing the charge weight remains as a valuable aid in increasing the hourly output of an open-hearth furnace. By using more compact and space-saving burner ports and the Maerz-Boelens form of cross-section, it is possible in many cases to increase the hearth area and charge weight of existing furnaces. Very often, the heavier charge must be teemed into two ladles, for which purpose the new spout arrangement according to Maerz and Romiti is particularly suitable.

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[2] Pottgiesser, C. H., Därmann, H., and Knackstedt, H., Stahl u. Eisen, 80 (1960), 22, pp. 1487-1492.

[3] Krabiell, H. J., and Knackstedt, E., Stahl u. Eisen, 80 (1960), 22, pp. 1492-1496.

[4] Romiti, M., and Schreiber, W., Radex-Rundschau, 1959, pp. 698-703.

Book Review

Constituent Elements in Steel and Cast Iron. London & Scandinavian Metallurgical Company, Limited, 39, Wimbledon Hill Road, London, S.W.19. 10s. 6d.

DESIGNED as a simplified guide to the effects of elements introduced into both steel and iron, this useful book has been compiled mainly to assist the firm's customers, but it is available to others interested at a nominal price. It is really a revised edition of one issued shortly after the last war. It was then pointed out in the preface that it was no easy task to classify the effects of the various alloy elements in ferrous materials. Apropos of that the present edition contains a foreword by K. C. Barraclough, B.Sc., A.Met., F.R.I.C., who points out that the original work dealt with the various elements alphabetically, although the decision in that respect was not taken as an easy option but for convenience of reference, and in his view the intervening years have not provided any more reasonable basis of classification. The same arrangement has therefore been adopted.

Some 29 elements are cited, the following particulars, common to all, being given at the beginning of each section:—Symbol; atomic number; atomic weight; density at 20 deg. C.; melting point; boiling point; thermal neutron absorption cross-section; crystal structure at 20 deg. C.

A revision of all data on the various elements has been undertaken, while additional information now available has been sifted in order to give a reasonably balanced picture of the present situation. An iron-carbon diagram and a periodic table of the elements are included.

COVERING AN AREA of 22,000 sq. miles, a visual air survey for possible deposits of vanadium in Western Australia is to be carried out by five men for Mangor Australia Pty., Limited, a subsidiary of Union Carbide, Limited. If results are promising, ground mapping will follow.

Liberian Iron-ore Developments

LIBERIA this year expects to reach its most significant economic milestone since it became one of the world's largest producers of rubber. Iron-ore shipments of this oldest African republic of 43,000 sq. miles will reach 3,750,000 tons with an approximate value of £14,350,000 and, for the first time, exceed the country's rubber production.

Iron ore has been shipped by Liberia only since 1951, the first exports being made by the Liberian Mining Company, a concession in Bomi Hills, 43 miles inland from Monrovia, the coastal capital. It took two years to build a railroad through the 43 miles of swamp, jungle, and mountain.

So far, the Liberian Mining Company has been the only producer, but during next month ore trains will begin to run from the Mano river concession of the National Iron Ore Company, Limited. Within two to three years, this mine will be shipping 5,000,000 tons a year.

In 1963-64, two other mining developments will come into production, one a £72,000,000 combine, the Lamco Joint Venture Enterprise, formed to exploit a mile-high mountain of solid iron, and the other Delimco (originally Deutsches-Liberische Minen), a £45,000,000 undertaking which is now constructing facilities in the Bong Hills. The two mines will have an eventual annual output of 12,000,000 and 5,000,000 tons, respectively.

New Zealand Mines to Close

Because of the failure of negotiations to renew the contract for the supply of New Zealand coal to Japan, two important State coal mines on the west coast of the South Island at Blackball are to be closed. The town of Blackball faces a bleak future as a mining town, as the two mines now to be closed provide the main source of employment in the area.

Developments in Sealing Mine Roadways

ALTHOUGH great strides have been made in coal mining with the introduction of labour-saving machinery, the development of new mines, and the reorganization of older ones, few advances have been made in either the control of spontaneous combustion or the erection of stopping to seal off a district following a fire.

Spontaneous combustion is a phenomenon peculiar to a number of coalfields and presents a hazard that is sometimes extremely difficult to control, especially if the heating develops beyond the incipient stage. The main method adopted in the control of this danger is to eliminate the flow of air to the heated region, but the difficulty has been to construct seals of sufficient compactness to prevent leakage.

A common method of sealing is to erect a barrier of sandbags and to plug the crevices in the barrier and the surrounding strata with sand or clay. The sandbag barrier is normally the first line of defence and when a more permanent and effective seal is needed a brick wall is erected, taking considerable time and effort to erect in hazardous conditions.

Neither method, however, provides a complete seal against air reaching the heating or the noxious gasses escaping from it. There are still small crevices between the seal and its surroundings, and in the adjoining coal and stone. Various methods of perfecting the seal, such as filling in with stone dust, and pumping in a cement mix under pressure, have been used; none has been a complete success.

In coalfields suffering from the dangers of spontaneous combustion, thoughts were turned to the idea of using some form of self-adhering coating as the final sealant, similar to the "cocooning" process for equipment preservation. The Warwickshire Area of the West Midlands Divisional Coal Board, where the danger is particularly prevalent, sought the help of the Dunlop chemical products division in preparing a suitable material. It had to be waterbased to prevent toxic or fire hazards, yet capable of drying out in a reasonable time in humid conditions. It had to be capable of adhering to any material for a long period, and the method of applying it had to be rapid and adaptable to underground conditions. It also had to be tough.

After three years' research and practical experiments in the West Midlands, the sealing fluid, a synthetic rubber spray, of the chloroprene group, has been developed. The sealant, which arrives ready for use in drums, can be applied by unskilled labour with a splatter spray of the type used for applying under-body seal to a car (Fig. 1). The film has air-retaining properties roughly equal to those of a natural rubber inner tube of a car.

Although the film applied takes approximately a week to acquire its complete hardness, sealing properties are shown immediately, and its use could easily be applied to the control of leakage through ventilation doors and airlocks.

A further development in the control of spontaneous combustion or mine fires, and also resulting from liaison between the Warwickshire Area of the West Midlands Divisional Coal Board and the Dunlop Rubber Company, is an inflatable seal.

Where heatings lead to active fires it is necessary to seal off the affected districts as quickly as pos-

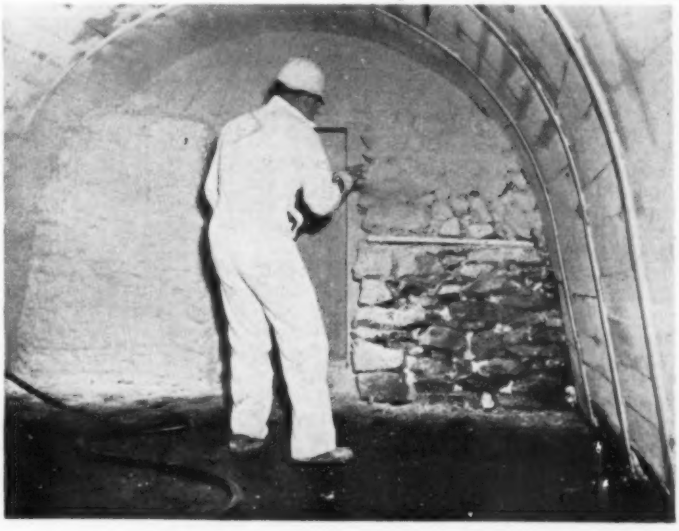


FIG. 1.—DEMONSTRATING THE APPLICATION OF LATEX FILM TO PREVENT LEAKAGE AROUND A VENTILATION DOOR.

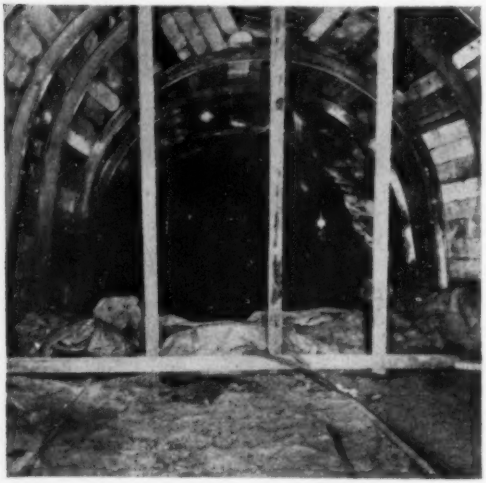


FIG. 2.—THE INFLATABLE SEAL, MADE OF P.V.C., REINFORCED WITH GLASS FIBRE, BEFORE ERECTION.

sible to reduce the flow of air entering the district and the quantity of carbon monoxide being given off in the return airway. It is also necessary to reduce the volume of smoke so that the erection of stoppings can be carried out quickly in a respirable atmosphere without personnel being hampered by breathing equipment. This is comparatively easy in the intake airway, but difficult in the return. Both operations usually involve the building of initial stoppings consisting of a wall at least two sand bags thick.

The Dunlop Rubber Company was asked to provide an inflatable seal with the following terms of reference:—(1) Air entering the district to be reduced by 90 to 95 per cent.; (2) the seal should be capable of erection in 5 to 10 min.; (3) it should be capable of transport by one or two men, and the complete equipment should be handled by a crew not exceeding five men; (4) compressed air to be the inflating medium; (5) it should be non-inflammable; (6) overall dimensions should cover all roadways up to 12 ft. wide and 10 ft. 6 in. high; and (7) it should be capable of conforming to irregularities in the periphery of the roadway.

The seal was tested at Arley Colliery, near Coventry, in a district that had just finished and was in the process of being drawn off. It was near the shaft bottom, with the full water gauge of the pit operating on it. The air flowing in the roadway was 7,000 cu. ft./min. at 3 in. water gauge. The site chosen was very rough, with jagged edges and timbering obstructions. The arches were 9 ft. by 8 ft. and in good condition.

After a test which resulted in certain modifications to the seal, due to the restriction of the roadway which was 9 ft., against the normal width of the seal of over 12 ft., it was also realized that to meet the strict requirements demanded a smooth lining would be necessary, and it was decided to lag the back of the rings with cover boards and pack behind them with sand.

The third test was carried out under the following conditions. As only one seal was available it was decided to erect a wooden stopping some 150 yd. on the intake side of the seal. The wooden stopping was fitted with a regulator, and it was hoped the flow of air could be reduced to 2,000 cu. ft. per min. It was found, however, that with the regulator fully closed, the quantity of air passing was 4,500 cu. ft./min. The regulator was subsequently adjusted to 5,000 cu. ft. and the seal was erected (Figs. 2 and 3). The seal was inflated from 6,000-lb./sq. in. air containers in 6 min. The quantity of air passing the seal was 1,500 cu. ft./min. with $\frac{1}{4}$ in. water gauge across it. This was felt to be completely satisfactory.

The advantages gained from the use of such a seal are:—(1) Speed of erection; (2) ease of transport; and (3) quick control of affected area.

The seal is constructed of p.v.c., reinforced with glass fibre. It is quilted to ensure its sealing qualities in a wide range of apertures. A central reed is used to disperse the air through the structure.

These two developments in the control of leakage and spontaneous combustion were recently demonstrated to delegates of the Wolverhampton mines rescue superintendents' conference. The demonstration was at Birch Coppice Colliery, near Tamworth. The application of the latex sealing compound to a ventilation door and its surrounding structure took about 15 min. The cost of applying the fluid varies considerably with the type surface being treated. It was reported that it varied from a few pence for a smooth surface to 2s./sq. ft. for a pack wall. The erection of the inflatable seal was carried out by one man in 5 to 10 min. in a 12-ft. wide by 10-ft. 6-in. high roadway.

FIG. 3.—THE INFLATABLE SEAL AFTER ERECTION. THE WOODEN STRUCTURE, ROUGHLY PLACED IN POSITION, WAS REQUIRED TO HOLD THE SEAL IN PLACE.

New High-pressure Cyclone Boiler

GREATER FLEXIBILITY IN COAL SUPPLIES

PLANNED growth of the Wilton Works of Imperial Chemical Industries, Limited, on the south bank of the river Tees, near Middlesbrough, necessitated the construction of another boiler for commissioning in 1959. This boiler was the subject of a paper which E. Holmes-Smith, J. Lister, and P. V. Liddell presented to the Institute of Fuel on March 22.

Examination of the factory steam:electricity demand ratio and of the economies of the size of the unit showed that no changes in the size or steam conditions as compared with a previous boiler installation was justified.

Development of cyclone firing in the US and in Germany had been kept under review and, after visits to both of these countries, it was concluded that cyclone firing of water-tube boilers had certain advantages.

These can be listed as:—

(*a*) Greater flexibility regarding choice of fuel supplies.

(*b*) The possibility of attaining small increases in efficiency, except with coals of very high ash content, by the use of lower excess air than with pulverized-fuel firing.

(*c*) Ash retention in the furnace is as high as 80 to 85 per cent. and the form of ash is less objectionable than that from pulverized-fuel firing for disposal either as fill or as a usable by-product.

Wilton Boiler Specified

Coal supplies are drawn from the Durham coalfield where ash-fusion temperatures as high as 1,490 deg. C. are encountered. German experience supported the view that a cyclone-fired boiler could be designed to give a satisfactory slag tapping when burning coals at the upper end of this range, particularly on a boiler where base loading is to be expected.

Accordingly, a new Wilton boiler was specified with cyclone firing, with a maximum continuous rating of 530,000 lb./hr. at 1,700 lb./sq. in. gauge pressure at 1,065 deg. F. Two German-type cyclones, each 10 ft. dia. and 16 ft. long, in which the air carrying the pulverized fuel is injected tangentially below the secondary air, were fitted to the Wilton boiler.

The primary air/coal mixture and the secondary air are injected through the ports at velocities of 16 m./sec. and 120 m./sec., respectively, these velocities being maintained constant at all boiler loads to give optimum combustion conditions. Combustion is almost complete within the cyclones, and the heat absorption of the cyclone surfaces is 70,000 B.t.u./sq. ft./hr. which accounts for approximately 14 per cent. of the total heat release in the boiler.

A "direct" milling system is installed, coal being ground as required and blown straight from the mills to the cyclones. The raw-coal feed from the mills is automatically controlled by a variable-speed drag-link feeder. The primary air is fed directly from the air-heater outlet at 655 deg. F., and is tempered as necessary by cool air drawn from the forced-draught fan discharge to maintain a constant mill outlet temperature of 257 deg. F.

Since commissioning in January, 1960, the boiler has been operated on coals drawn exclusively from the Durham coalfield, and mainly from Horden Colliery.

Typical analyses are given in Table 1.

TABLE 1.—*Typical Analyses of Durham Coals Used in the Boiler.*

Proximate analysis.	Horden.	South Hetton.	Harraton.	Vane Tempest.
Moisture, per cent. ..	3.1	4.4	3.6	3.7
Volatile content, per cent.	30.6	27.6	21.3	30.9
Fixed carbon, per cent. ..	52.4	42.6	56.3	50.5
Ash, per cent.	13.9	25.4	18.8	14.9
Gross calorific value, B.t.u./lb.	12,870	10,220	11,600	12,170
Ash characteristics:				
Initial deformation temperature, deg. C.	1,190	1,180	1,320	1,140
Fusion temperature, deg. C.	1,250	1,240	1,400	1,210

The highest ash-fusion temperature encountered was in excess of 1,420 deg. C. with single consignment from the West Auckland Park Colliery stockpile.

This coal gave a more viscous slag than usual, but tapped without difficulty.

Bulgarian Ore-mining Developments

ORE mining, according to an official report from Sofia, is being given high priority under the current economic plan—as the key to other industrial development, notably of shipbuilding and engineering. In 1960, Bulgaria produced about 400,000 tons of iron ore, 3,058,600 tons of lead-zinc ore, 1,122,500 tons of copper ore, and 37,700 tons of pyrites.

Capital investment in ore mining during the present year is planned to be substantially increased for the development of the iron-ore mining enterprise at Kremikovtsi, near Sofia, which is expected eventually to have an annual output of some 5,000,000 tons.

New Patents

PATENTS below are among the complete specifications accepted listed in the Official Journal (Patents). The numbers given are those under which the specifications have been printed and all subsequent proceedings will be taken.

Applications for copies of the full specifications (3s. 6d. each, post free) should be made to the Patent Office, 25, Southampton Buildings, Chancery Lane, London, W.C.2.

Mining and Mining Appliances

857,705 SALZGITTER MASCHINEN, A.G. Conveying devices for use in mining and tunnelling operations.

858,011 DOWTY MINING EQUIPMENT, LIMITED. Pushing devices for shifting mining machinery.

857,589 GEWERKSCHAFT EISENHUTTE WESTFALIA. Double-chain scraper conveyors.

857,631 MINE SAFETY APPLIANCES COMPANY. Gas detection.

857,744 FORGES ET ATELIERS DE LA NAVE. Rolled members of channel or trough section for the construction of mine frames.

858,292 BELTFASTENERS, LIMITED. Machines for applying fastening hooks to the ends of conveyor belts.

858,633 GEWERKSCHAFT EISENHUTTE WESTFALIA. Shiftable mine roof support structure.

858,414 G. A. BLACK. Pit winding drums.

858,439 MINING ENGINEERING COMPANY, LIMITED. Gummer.

858,408 HAYDEN-NILOS, LIMITED. Stilting of mine arches.

858,761 MAVOR & COULSON, LIMITED. Coal cutters.

859,217 MASCHINENFABRIK MONNINGHOFF. Rotary tipper for wagons.

858,907 GUTEHOFFNUNGSHUTTE STERKRADE, A.G. Apparatus for use in the lining of mine shafts.

858,870, 858,871, 858,872, 858,873, 858,874 WOLF SAFETY LAMP COMPANY (W. MAURICE), LIMITED. Safety lamps.

859,226 WORTHINGTON-SIMPSON, LIMITED. Flameproof motorized pump units of ventilated type.

859,148 W. H. BARKER & SONS, ENGINEERS, LIMITED. Retarder chains for mine cars.

859,874 HOLLYBANK ENGINEERING COMPANY, LIMITED. Coal-cutting machines.

859,949 ANDERSON, BOYES & COMPANY, LIMITED. Mineral-mining machines.

859,878 BOCHUMER GESELLSCHAFT FUR GRUBENAUSBAU UND TECHNIK. Hydraulic pitprop.

859,757 HUMPHREYS & GLASGOW, LIMITED. Apparatus for arresting mine cars.

859,667 CRAWLEY INDUSTRIAL PRODUCTS, LIMITED. Coal-cutting machines.

859,426 ENGLISH DRILLING EQUIPMENT COMPANY, LIMITED. Earth and like boring or drilling apparatus.

859,618 GELSENKIRCHENER BERGWERKS, A.G., Coal-cutting and extraction apparatus.

859,464 GEWERKSCHAFT EISENHUTTE WESTFALIA. Coal plough having a kerfing bit which is guided along the floor.

860,164 GUTEHOFFNUNGSHUTTE STERKRADE, A.G. Hydraulic pitprops.

860,195 BOCHUMER GESELLSCHAFT FUR GRUBENAUSBAU UND TECHNIK. Walling for mines.

860,012 MASCHINENFABRIK KORFMANN, G.m.b.H. Coal-getting machines.

860,431 ASSOCIATED ELECTRICAL INDUSTRIES, LIMITED. Electrically driven hoists, winders, and the like.

860,787 MAVOR & COULSON, LIMITED. Cutter-chain machines for mining coal.

860,446 DOWTY MINING EQUIPMENT, LIMITED. Mine roof supports.

860,576 MINE SAFETY APPLIANCES COMPANY. Detecting minute concentrations of gases and vapours.

860,706 APPLICATIONS SCIENTIFIQUES, TECHNIQUES INDUSTRIELLES ET COMMERCIALES A.S.T.I.C. Mine roof supports.

Metallurgical and Engineering

857,861 WEAN EQUIPMENT CORPORATION. Apparatus for treating strip.

857,828 WEAN EQUIPMENT CORPORATION. Shearing continuously advancing strip.

857,778, 857,779, 857,780 WOODALL-DUCKHAM CONSTRUCTION COMPANY, LIMITED. Cleaning the sealing surfaces of the doors and frames of horizontal coke ovens.

857,793 LOEWY ENGINEERING COMPANY, LIMITED. Apparatus with a flexible drum for coiling and decoiling metal strip.

858,283 BRITISH THOMSON-HOUSTON COMPANY, LIMITED. Measuring the thickness of elongated bodies, such as steel wire.

858,233 SWIFT & COMPANY. Treatment of iron and steel.

858,404 UNION CARBIDE CORPORATION. Method of lowering the carbon content of chromium-bearing steels.

858,235 PECHINEY COMPAGNIE DE PRODUITS CHIMIQUES ET ELECTROMETALLURGIQUES. Manufacture of manganese.

858,296 NATIONAL RESEARCH DEVELOPMENT CORPORATION. Rolling mills.

858,606 BOULTON PAUL AIRCRAFT, LIMITED. Rolling-mill coiling apparatus.

858,833 SCHLOEMANN, A.G. Double-billet extrusion presses.

859,192 SANDVIKENS JERNVERKS, A.B. Sintered hard metal alloy.

858,958 FOUNDRY SERVICES INTERNATIONAL, LIMITED. Treatment of molten metals.

859,349 UNITED STATES STEEL CORPORATION. Soaking pit furnaces.

859,566 DALMINE, S.P.A. Rolling mill control apparatus.

859,421 DEMAG, A.G. Stripper tongs.

859,536 DORTMUND-HORDER HUTTENUNION, A.G. Apparatus for degasifying metal melts.

858,377 ARBED, ACIERIES REUNIES DE BURBACH-EICH-DUDELANGE, S.A., and CENTRE NATIONAL DE RECHERCHES METALLURGIQUES. Manufacture of steel.

858,643 MORGAN CONSTRUCTION COMPANY. Guide for a rolling mill.

859,293 ARBED, ACIERIES REUNIES DE BURBACH-EICH-DUDELANGE, S.A. Lances for blowing solid material into a melt of metal.

859,463 H. J. DAUSSAN. Floats for ingot moulds.

859,808 N. W. ROUDABUSH. Metallurgical furnaces.

859,826 BRITISH IRON AND STEEL RESEARCH ASSOCIATION. Containers for use during the casting of molten metal.

859,827 BRITISH IRON AND STEEL RESEARCH ASSOCIATION. Plugs for molten metal containers.

860,350 BRITISH IRON AND STEEL RESEARCH ASSOCIATION. Control systems for moving strips.

860,661 OSBORN MANUFACTURING COMPANY. Brushing apparatus for cleaning elongated articles such as steel strip.
860,709 O. RUTHNER. Pickling alloy steels.

Fuel Treatment and Utilization

857,919 L. & C. STEINMULLER, G.m.b.H. Simultaneous production of coal gas and electricity.
858,132 RUTGERSWERKE, A.G. Preparation of coal tar pitches.
858,284 L. & C. STEINMULLER, G.m.b.H. Degasification of coal dust.
858,362 L. & C. STEINMULLER, G.m.b.H. Degasification of coal dust.
858,756 E. HARVENGT. Treatment of materials in very small particles, particularly coal and ore slimes.

Welding Electrodes for Aircraft Jigs

ESTABLISHED method of fabricating aircraft jigs at Vickers-Armstrongs (Aircraft), Limited, was, until recently, the use of angle, channel, round steel bars, and tube fabricated by riveting bolting and, for close tolerance—jig boring and pinning; welding was used only as a supplementary fixing. Now, with experience gained in using metal arc welding for some of the jigs for the Vanguard, Vickers has completely turned to using metal arc welding in fabricating jigs for the new VC 10 turbo-jet aircraft.

Speed of construction and simplification of jointing were two of the major factors which had to be considered. Vickers decided to use pre-fabricated standard box sections of 6 in. by 6 in. and 10 in. by 6 in. of stock length; and it was essential that each section be accurately welded.

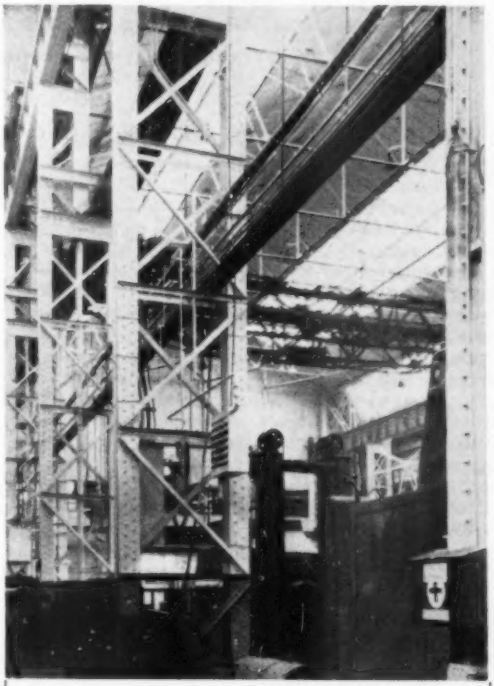
When Vickers was planning to introduce this new method of jig fabrication, Research & Control Instruments, Limited, sole distributors in the UK for Philips welding electrodes, were approached. Philips iron powdered electrode C23 has proved to be ideal for welds carried out in the downhand position. The C23 also gave the added advantage of speed. For on site welding, however, the Philips 68 all-positional electrode was recommended.

Vickers has estimated that this method of fabricating aircraft jigs using standard box sections and Philips welding electrodes is 50 to 60 per cent. faster than constructing similiar jigs using the old process and, of course, there is a considerable saving on costs.

SIXTY-TWO LOCOMOTIVES, passenger coaches, and freight wagons will be delivered to Peru under a contract signed by the Peruvian Government and Mitsubishi, of Japan. The equipment will be used on the new Huadquiña-Quillabamba railway.

QUESTION OF subsidizing coal transport costs to enable consumers to get supplies at a uniform rate, irrespective of the mode of transport, is being considered by the Indian Government. At present, seaborne coal (which is partly conveyed by rail, anyway) costs nearly twice as much as coal moved by rail.

Open Steel Plank Cable Trunking



Davy & United Engineering Company, Limited, Sheffield, has found a novel use for Dexion open steel plank, a material primarily intended as a robust flooring. With machinery and other plant having to be moved occasionally, the under-floor service cable system was found to be a complication.

Open steel plank, framed with Dexion slotted angle, is now being installed overhead as heavy-duty cable trunking. The plan is to raise all cables on to this trunking, which can support the weight of a man.

WEST GERMAN crude steel output in April fell to 2,770,000 tons, compared with 3,080,000 tons in March, representing a daily average of 104,444 (106,129) tons. Pig-iron production also declined to 2,100,000 tons from 2,250,000 tons, corresponding to a daily average of 69,963 (72,475) tons.

A LOAN equivalent to $12,000,000 for the expansion of electric generating capacity on the island of Kyushu, Japan, has been approved by the World Bank. It will assist in financing the construction of a 156,000-kW thermal power plant at Kokura, in northern Kyushu, one of the most heavily industrialized areas of Japan.

Mining Oversea

in which we review, from time to time, interesting mining matters reported by our contemporaries abroad

WATER CARTRIDGES FOR STEMMING

TESTS have recently been carried out at the Bavarian Colliery, Hausham, with cartridges from p.v.c. material, 11 in. long and 1⅛ in. thick, which are filled with 7½ fluid oz. of water at 7 lb./sq. in. gauge pressure. The filling was done at a pumping station underground. Instead of stemming with three clay plugs, the 3-ft. 3-in. shotholes were tamped with one water cartridge and one clay plug.

The advantages of the new method were found to be a better utilization of the explosive energy of a charge so that savings in explosive consumption from 8 to 30 per cent. are obtainable. The distance between shotholes was increased and the time required for drilling was reduced by up to 18 per cent. An additional important benefit was also obtained by a reduction in concentration of dust at the face.—H. MEDER, Glückauf, February 1, 1961.

MINE-CAR HANDLING

WHERE the length of pneumatic or hydraulic pushers would be impractically long, a simple device shown in Fig. 1 can be used to move either single tubs or whole trains over any desired distance. Two lengths of channels are laid between the rails and each of them acts as a guide for a small rope-driven carriage on four rollers with latches *a* for pushing the tubs. The latches collapse in the direction of the arrow on the illustration on the return journey, while on the forward journey they stand upright against the stop *b*. The winch itself is of the two-drum type and is erected outside the track itself.

Two collieries in the Ruhr have had several of these installations in satisfactory service for a number of years for handling whole trains at the main shaft and staple shaft landings and also to act as car spotters between staple shafts and loading stations. Recently a similar installation has been adopted for hauling trains of three full tubs up a 80-yd. incline of 11 deg., in which the reversal of the hoist is effected automatically so that haulage takes places continuously.—O. BÖTTGER, Glückauf, January 4, 1961.

MINING OF CONTIGUOUS SEAMS

AT the Osterfield Colliery, Ruhr, the 4-ft. 1-in. Matthias 3 Seam is separated from the 5-ft. 1-in. Matthias 1 Seam by a bed of shale from 5 ft. to 7 ft. thick. After tests with the caving method it was found that pneumatic stowing of the goaf made the successive mining of these two seams less difficult, the upper seam being taken first. The daily advance of the longwall face in both seams was raised to 5 ft. 3 in. and the o.m.s. in the 440-yd. faces was 7.7 tons for the face, 6.2 tons for the coal face, including face transport, and 5.71 tons for the district.—K. ROTHSTEIN, Glückauf, November 19, 1960.

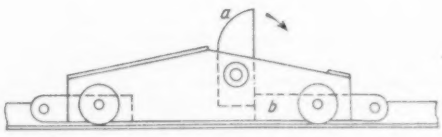
Coal Mining in India

OUTPUT of coal in India during 1958, according to the annual report of the Chief Inspector of Mines for that year, was 45,226,767 tons, compared with 43,290,000 tons in 1957 and 39,280,000 tons in 1956. Despatches of coal, excluding coke, amounted to 40,187,609 tons in 1958, as against 37,588,675 tons in the preceding year.

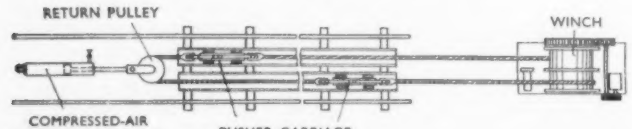
The amount of coal utilized for coke making at the collieries was 3,180,153 tons, *i.e.*, about 7 per cent. of the total output, the corresponding figure for 1957 being 2,948,073 tons (6.8 per cent.). In addition, 2,163,342 tons of coal, *i.e.*, 4.8 per cent. of the total production, was consumed at the collieries.

Output of coal by workers at the face, including loaders, was 335 tons in 1958, against 339 tons in 1957, the corresponding figures for all employees above and below ground being 118 and 117 tons, respectively.

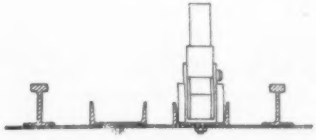
PLAN OF PUSHER CARRIAGE



SIDE VIEW OF CARRIAGE



PLAN OF INSTALLATION



SECTION THROUGH TRACK AND CARRIAGE

FIG. 1.—ROPE-DRIVEN MINE-CAR HANDLING DEVICE.

Dust Collection on "AJAX" FURNACES

One of the iron and steel industry's major problems is the minimization of atmospheric pollution, and in this respect considerable improvements have been made in recent years. Possibly the most outstanding have been the reduction in dirty gas evolved from blast furnaces, the almost entire disappearance of chimneys emitting black smoke, and the considerable replacement of steam locomotives by diesels.

SINCE the introduction of oil firing and consequent abolition of gas producers with their daily and weekend dust removal and flue cleaning, the open-hearth plant has been a much less significant contributor to air pollution. The fume evolved from its chimneys is usually only light brown in colour; it consists of very small particles and does not constitute any great weight of emission or deposit.

Introduction of Oxygen Lancing

The recent introduction of oxygen lancing to open-hearth furnaces has altered all of this. The effect of bath lancing is to cause the furnace bath to produce considerable volumes of reddish brown smoke which, if allowed to escape to the atmosphere from the chimney, gives a considerable discoloration thereto, not necessarily because of the weight of dust contained, although this is quite significant, but because of the extreme fineness of the particles constituting the voluminous fume.

In view of modern developments in steelmaking in other countries, and of the considerable potential for increasing production in open-hearth furnaces by oxygen lancing, it was clear that this country, if it was desired to continue to maintain the maximum economy of steel production, could not ignore the use of oxygen merely because of the fume it produced.

At Appleby-Frodingham the problem of dust removal from open-hearth furnace gases was faced in 1957. At this time the only method which appeared to be able to guarantee the removal of red iron oxide dust, at a medium plant cost, was the bag filter. Such a filter, preceded by a fire-tube waste-heat boiler, was installed at the end of the year and came into use shortly afterwards. The filter bags were of a "Terylene"-type fabric. Immediately the furnace came into operation these bags were attacked by acids and destroyed in a few days. Experiments using various other similar based materials gave no significant improvement and eventually glass fibre bags were introduced. These were satisfactory for filtering, but could not be shaken at frequent intervals, as is the normal practice with this type of filter plant, without the bags being rapidly destroyed.

Various methods were tried in efforts to dislodge the dust, but it was almost impossible to overcome the very high-pressure drop across the bags. This kept the volumetric capacity of the plant much lower than would have been expected had the "Terylene" bags and normal shaking methods been satisfactory. The cost of maintenance for bag replacements is also significant, and the work of bag changing very dirty and not at all liked by the men who are expected to do it, a point which is quite understandable.

The cost of gas-cleaning plant is closely related to the gaseous volume it has to handle. To minimize this and for other operational reasons connected with the furnace, it was decided completely to steel encase the ports, uptakes, slag pockets, regenerators, flues, and boilers to minimize air infiltration and thereby materially reduce the size of the fume-cleaning plant required.

While the original bag filter was operating, a pilot plant rig was set up by manufacturing companies interested in building electrostatic cleaners. This collected and cleaned gas from the furnace flue and based on this work the first electrostatic cleaner on an Appleby-Frodingham "Ajax" furnace was eventually built. This was built as a single-stage cleaner and suffered from many teething troubles during its first few months of operation. Modifications were made and the cleaner was finally converted to two-stage operation.

Based on the acquired experience the next electrostatic cleaner was built with three stages, and has been operating for 12 months. Another has now been working for six months and both are giving clean stacks. This type of cleaner has now been established as standard practice for "Ajax" furnaces and has already been ordered for the next three conversions. When the changes are completed the plant will comprise eight "Ajax" furnaces all giving fully cleaned stack emissions.

It is preferred to cool the gases prior to cleaning by a waste-heat boiler, and experience has shown that after allowing credit for the steam raised at a price equivalent to the cost of making it in a modern fuel-fired boiler, this credit is more than sufficient to pay for the operation of the waste-heat boiler and the gas-cleaning plant.

The amount of waste-heat boiler steam generated

by the "Ajax" furnace varies from 9,500 lb. to 13,000 lb. per hr., compared with the standard tilting furnaces of 20,000 to 23,000 lb. per hr. The relative weight per ton of product therefore, is much smaller in the "Ajax" furnace, being about 400 lb. as an average over the last six months, compared with some 1,050 lb. on an adjacent standard tilting furnace.

Until recently the dust from the fume cleaners was sent to the blast-furnace sinter plant, but now a method of pelletizing, on an experimental scale, has been established. A larger plant is being installed and experiments to date have indicated that the pelletized dust can be passed back to the open-hearth furnace without detriment to the process and with a saving to the open-hearth shop of an equivalent quantity of high-carbon feed ore.

This saving is not included in the figures quoted above.

The specification of the most recent design of precipitator which has easily dealt with the gases from a weekly production in excess of 6,000 tons is shown below:—

Gas volume (NTP), 1,500,000 cu. ft./hr.; inlet gas temperature, 250 deg. C.; gas dewpoint, 35 deg. C.; inlet dust concentration, 7.0 grain/N. cu. ft.; outlet dust concentration, 0.05 grain/N. cu. ft.; guaranteed efficiency, 99.3 per cent. pressure drop (maximum), 0.25 in. w.g.; approximate power input, 36 kW.

The average dust collected is 30 tons per week per furnace (13.4 lb./ton of ingots) and this contains 65 per cent. Fe.

It is now considered that the problem of dust collection from "Ajax" furnaces, when oxygen lancing, is solved in a satisfactory and economic manner.

BIG ORDERS PLACED AT LEIPZIG FAIR

BRITISH firms are stated to have concluded contracts worth £5,400,000 with East Germany at this year's Leipzig Spring Fair, compared with £3,600,000 at the 1960 fair. Substantial orders were received for steel products and machinery. British purchases totalled £4,000,000, and East German orders from Britain came to £1,400,000.

East German orders with British steel firms totalled £487,000, including contracts worth £150,000 with British Ropes, Limited, Doncaster, £120,000 with Graham Firth Steeel Products, Limited, Walsall, and £60,000 with T.I. (Export), Limited, Birmingham. Yugoslavia placed two substantial orders with the English Steel Corporation, Limited, Sheffield.

East Germany also placed orders worth £68,000 with R. H. Windsor, Limited, Chessington (Surrey), for injection moulding machinery, and contracts were signed with Dowding & Doll, Limited, London, W.14, for machine-tool presses worth £11,000, and cranes and building machinery from Ransomes & Rapier, Limited, Ipswich, K & L Steelfounders & Engineers, Limited, Letchworth (Herts), Steels Engineering Products, Limited, Sunderland, Aveling-Barford, Limited, Grantham, and Marshall Sons & Company, Limited, Gainsborough (Lincs), to the value of £55,000.

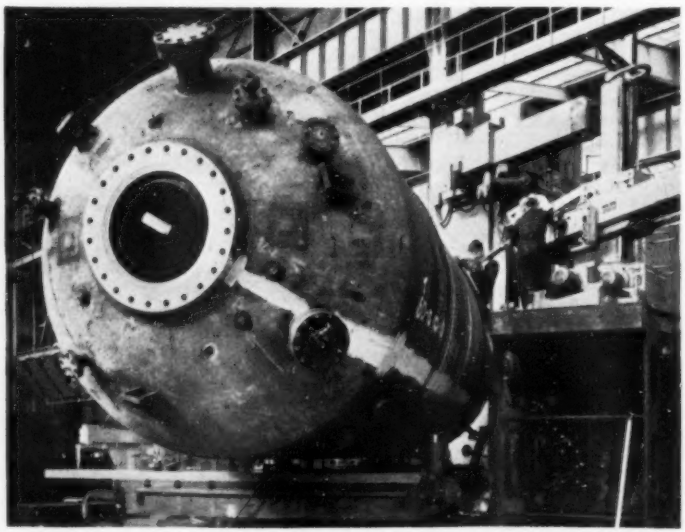
Further East German orders included:—Fords (Finsbury), Limited, Bedford, bottle topping machinery for £14,000; Sharples Process Engineers, Limited, Camberley (Surrey), centrifugal and process equipment for £66,000; Baker Perkins (Exports), Limited, Peterborough, food processing and packaging machinery for £9,000.

Built in Britain to Lurgi Designs

SUPPLIED by the Power-Gas Corporation, Limited, Stockton-on-Tees, a member of the Davy-Ashmore, Limited, group, this high-pressure gasification vessel is the first to be built in Britain to Lurgi designs.

It is seen undergoing machining operations at the Stockton works before despatch to the Westfield gas plant in Fifeshire.

The Westfield gas plant has been engineered by Humphreys & Glasgow, Limited, for the Scottish Gas Board.



NCB REPORT AND ACCOUNTS FOR 1960

Board's Main Objectives Achieved

Given steady industrial activity and normal temperatures, the National Coal Board expects that demand for coal this year will remain at about last year's level. Deep-mined output may be slightly less than in 1960, so that undistributed stocks should be further reduced. Open-cast output will be about the same as last year. The board's report and accounts for 1960, published last Friday and summarized very briefly in our last issue (p. 1154), show that the NCB's operating profit in 1960 was £20,200,000, compared with £13,176,000 in 1959.

MAIN objectives of the National Coal Board in 1960—to bring coal production below the level of demand, without any substantial measure of hardship to the mining community, and to secure a satisfactory increase in efficiency—were achieved. In its annual report the board states that consumption exceeded production by nearly 9,000,000 tons; stocks held by the board fell by 6,500,000 tons. Although 44 pits were closed or merged with others, all but 250 of the men displaced found other work by early in 1961.

Distribution difficulties were experienced during the winter, but consumers were, in general, kept regularly supplied, and the quality of the coal sent out was better and more consistent than previously. Consumers have received useful help from the board's technical and sales service. Costs were rigidly controlled. Productivity was further increased by 3.7 per cent. The board's administrative staff was cut by a further 5 per cent. during the year.

A Heavy Burden

The cost of carrying stocks of coal and coke remained a heavy burden, at some £12,500,000 (compared with £27,000,000 in 1959). Overheads had to be borne by a smaller output, and—as in other industries—there were increases in wages and salaries. With the assent of the Ministry of Power, prices were raised, on average, by about 7s. a ton from September 19. The industry can take pride that it has weathered the biggest fall in demand since the early 1930s with its productive capacity unimpaired, its efficiency increased, and without severe hardship to its workpeople and their families. Despite fierce competition from oil, coal used efficiently in modern appliances remains a fully competitive source of heat and power.

Thirty-three major construction projects were completed. Work progressed steadily on 103 reconstructions of existing pits and on 13 new collieries, three of which were brought into production. Plans were approved for 12 major new projects. The board has approached Government departments to site new factories in those places where other jobs are required as a result of colliery closures.

Mechanization of coal winning and loading was greatly extended, and will proceed still faster in 1961. Progress towards the 1965 target productivity of 30 to 31 cwt. a manshift was again excellent and should be accelerated in 1961 as a result of the increased number of machines and concentration of production in fewer and more modern pits.

The board spent £4,800,000 on research and development work and its expenditure in 1961 is likely to be greater. It will be spending much more on the promotion of sales of coal and coke. Exports, in a difficult and highly competitive market, are likely to be about the same as in 1960.

MARKETING

Competition from oil became stronger, but the board's selling activities helped to maintain a high level of demand for solid fuel. Total inland consumption of coal, at 196,900,000 tons, was some 7,300,000 tons more than in 1959. Consumption at power stations increased by 5,100,000 tons and at coke ovens by 2,800,000 tons. The domestic market took 1,500,000 tons more house coal than the previous year. Improved efficiency in use and the substitution of alternative fuels (including fuels made from coal) meant that rather less coal was used by railways, gasworks, and general industry. Oil consumption increased in markets where coal could have been used by the equivalent of some 7,400,000 tons of coal, or 24.4 per cent., over 1959. More gas was made from oil and more gas was purchased from oil refineries and converted into town's gas. The board also sold more methane to the gas industry. Nevertheless, the total amount of coal sold to the gas industry fell by only 200,000 tons.

Oil used by the Central Electricity Generating Board increased in terms of coal equivalent by some 2,000,000 tons to 9,000,000 tons. Deferment of the conversion of two power stations to oil firing, originally agreed in 1959, was extended.

The fact that consumption exceeded output meant that 6,500,000 tons of coal could be lifted from the

35,700,000 tons held by the board at the beginning of 1960 at pits and stocking sites. This coal had not deteriorated to any substantial degree and the provisions made in the board's accounts for degradation were fully sufficient. Distributed stocks—coal held by consumers and merchants—fell during the year by 900,000 tons to 13,400,000 tons—the lowest end-of-year figure since 1950.

Transport and Distribution

To meet traffic difficulties on the railways in some areas early in 1960 some coal was diverted temporarily to road. But there was no major interruption of supplies. Some merchants, too, had difficulties in supplying consumers in the early months of the year, when they were short of labour and when cold weather caused a rapid influx of orders. During the summer discussions were begun with the British Transport Commission to adjust supplies of coal between the various methods of transport so as to avoid or minimize the difficulties which might be caused in the winter of 1960-61 by continued shortage of key railway operating staff or maldistribution of wagons. The most satisfactory long-term solution to this problem is considerably increased stocking by consumers during the spring and summer.

The unofficial strike of seamen in the summer of 1960 severely curtailed coal shipments from the north-east coast. Normal stockbuilding for the winter months and export shipments were affected and this strike is estimated to have cost the board over £250,000 in increased stocking charges.

Coal Prices

The price of coal remained unchanged from July, 1957, to the autumn of 1960. It became apparent in the summer of 1960 that an increase was inevitable. Overheads were being borne by a smaller output of coal and coke; the costs of putting coal and coke to stock were heavy; the prices of materials used in coal production were rising. The board had also to take into account awards made by the National Reference Tribunal which, with consequential increases, would cost over £10,000,000 in a full year. Despite the increased prices, averaging 7s. a ton, brought into effect from September 19, the pithead prices of most British coal still remained lower than those charged in western Europe.

The board took special steps to make more large coal available for the domestic market; in the last five months of the year the board sent out 1,800,000 tons more and merchants' disposals of house coal rose by 2,100,000 tons over the previous year's figure. In March, 1960, the board introduced a loan scheme—the "Housewarming Plan"—to make it easier to buy and install modern appliances which burn solid fuel. The scheme was directed to householders and owners of small commercial and industrial premises. There has been a good response to the scheme, which has helped to secure for solid fuel its share of the expanding market for central heating and to popularize the improved appliances which burn a wide range of solid fuels and comply fully with the Clean Air Act.

A big expansion in the board's technical and commercial sales service was undertaken in 1959 and in 1960, with a bigger staff available, the board was able to assist industrial consumers in all parts of the country with expert advice on the type of equipment, the choice of fuel, and methods of operation. The board contributed some £280,000 to the National Industrial Fuel Efficiency Service—by far the largest single contribution—and £290,000 to the Coal Utilization Council. The CUC improved its facilities during the year and, with the board's support, these are to be further extended.

The sale of packaged fuel increased in 1960. Several packaging plants were started up during the year and more are planned. The possibility of automatic vending machines is also being looked into.

The British Coal Utilization Research Association continued work on the development of appliances that will work automatically for long periods and not emit smoke or grit. Towards the end of the year preliminary trials began on a fully automatic industrial boiler plant, and a development programme has been started in co-operation with a number of appliance makers. The miniature chain-

TABLE 1.—*Costs of Production, Proceeds, and Profit of Collieries for the Year* 1960 (*Great Britain*).

	Tons.	
OUTPUT OF COAL:		
Disposable commercially	173,928,675	
Mine consumption	5,010,630	
Miners' coal	4,829,984	
Saleable tonnage from NCB mines	183,769,289	
COSTS AND PROCEEDS:	**Amount.**	**Per ton saleable.**
	£	s. d.
Wages (including holiday pay, sick pay, and allowances in kind)	432,574,265	47 0.9
Roof supports, general stores, and repairs	131,923,588	14 4.3
Coal and power consumed	37,147,097	4 0.5
Other costs (including depreciation)	174,023,964	18 11.3
TOTAL COSTS	775,668,914	84 5.0
PROCEEDS	791,267,821	86 1.4 *
PROFIT (before charging interest)	15,598,907	1 8.4

AVERAGE EARNINGS (ALL AGES):	Cash earnings.	Value of allowances in kind.	Total.
Per manshift worked:	s. d.	s. d.	s. d.
At the face	78 3.2	4 2.4	82 5.6
All underground	66 7.8	3 10.0	70 5.8
Surface	45 2.0	3 3.5	48 5.5
All workers	62 0.5	3 8.6	65 9.1†
Per wage-earner per week:	s. d.	s. d.	s. d.
At the face	336 6	18 1	354 7
All underground	308 1	17 8	325 9
Surface	236 2	17 3	253 5
All workers	294 1	17 7	311 8†

* Receipts in respect of miners' coal supplied at concessionary rates, included in proceeds, amounted to £1,505,427 for the year 1960.

† The estimated average earnings in the industry, including the value of allowances in kind, in Great Britain for all adult male workers, 21 years of age and over, in the year 1960, amounted to 68s. 1d. per manshift worked and 324s. 0d. per week.

TABLE 2.—*Costs of Production, Proceeds, and Profit or Loss of Collieries for the Year* 1960.

	Scottish Division.	Northern (N & C) Division.	Durham Division.	North-Eastern Division.	North-Western Division.	East Midlands Division.	West Midlands Division.	South-Western Division.	South-Eastern Division.
OUTPUT OF COAL:	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Disposable commercially	16,602,985	11,509,505	21,616,095	37,736,091	12,207,498	41,929,348	13,063,533	17,861,273	1,402,347
Mine consumption	558,723	129,860	236,664	1,564,510	437,442	963,662	444,975	629,223	45,571
Miners' coal	487,282	362,729	911,481	1,116,567	253,991	766,828	332,147	562,708	36,251
Saleable from NCB mines	17,648,990	12,002,094	22,764,240	40,417,168	12,898,931	43,659,838	13,840,655	19,053,204	1,484,169
	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.	Per ton saleable. s. d.
COSTS AND PROCEEDS:									
Wages (including holiday and sick pay and allowances in kind) ..	56 5.8	50 8.6	59 3.5	43 3.0	48 7.3	33 9.2	45 7.2	58 11.4	62 6.3
Roof supports, general stores, and repairs ..	16 4.9	14 9.0	14 2.0	13 7.2	15 9.9	12 7.8	14 8.6	16 7.1	15 7.5
Coal and power consumed	4 8.1	3 1.7	3 8.9	3 10.4	4 6.6	2 9.0	4 2.4	7 0.0	7 4.7
Other costs (including depreciation)	23 10.8	19 2.1	19 11.3	15 6.6	24 1.6	14 2.7	22 5.7	24 8.8	21 0.0
TOTAL COSTS	101 5.6	87 9.4	97 1.7	76 3.2	93 1.4	63 4.7	86 11.9	107 3.3	106 6.5
PROCEEDS	89 5.9	83 10.1	95 6.8	84 4.9	90 3.0	73 0.7	87 5.9	101 7.4	102 0.8
PROFIT OR LOSS (before charging interest) ..	Loss. 11 11.7	Loss. 3 11.3	Loss. 1 6.9	8 1.7	Loss. 2 10.4	9 8.0	0 6.0	Loss. 5 7.9	Loss. 4 5.7
(*a*) MANSHIFT AND (*b*) AVERAGE WEEKLY EARNINGS (including value of allowances in kind):	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
At the face .. (*a*)	77 11.2	87 4.7	79 8.2	86 4.1	81 6.5	94 2.2	83 8.5	68 11.6	95 2.1
.. .. .. (*b*)	344 1	392 11	362 7	349 10	351 6	397 9	344 9	304 2	388 4
All underground (*a*)	67 3.9	73 0.2	69 1.9	72 6.3	68 10	77 1.1	70 5.3	63 8.7	77 7.7
.. .. (*b*)	315 4	342 3	329 7	326 2	314 11	356 6	320 0	294 9	350 11
Surface .. (*a*)	44 11.7	49 5.9	50 7.1	47 11.5	48 1.9	49 11	48 0.5	47 10.4	49 8
.. .. (*b*)	228 0	259 11	251 2	256 5	259 9	263 2	247 6	255 9	273 7
All workers .. (*a*)	63 1.8	67 8	65 8.7	67 1.2	64 5.6	71 0.4	64 7.7	60 1.8	71 6.2
.. .. (*b*)	300 0	325 2	315 7	312 9	304 9	337 9	302 11	286 11	336 6

grate stoker underwent successful trials in a London block of flats.

Export and bunker shipments increased from 4,300,000 tons in 1959 to 5,600,000 tons in 1960. Competition from other coal producers, particularly Poland and Russia, and from alternative fuels, remained strong. Some continental coal-producing countries imposed restrictions on coal imports, and prices were generally unattractive.

PRODUCTION AND RECONSTRUCTION

Total output of saleable coal was 193,600,000 tons, 12,500,000 tons less than in 1959, and the lowest since 1946. Early in the year measures were taken to restrict output, but later the shortage of manpower in some divisions also caused output to be lower than in previous years. Efficiency continued to improve and productivity again reached a record level. Deep-mined output was 186,100,000 tons, including 2,200,000 tons from licensed mines. Output from the board's collieries, at 183,800,000 tons, was 8,700,000 tons less than in 1959.

During the year 44 collieries were closed or merged with other collieries. Half were closed because their reserves were exhausted; 16 others were involved in schemes or reorganization, reconstruction, or concentration. Six were closed mainly for economic reasons.

Towards the end of 1959, negotiations were opened with the Federation of Small Mines of Great Britain with a view to limiting disposals from licensed mines to help meet the problem of excess production, and agreement was reached in March, 1960. A quota of 2,200,000 tons was fixed for 1960 (excluding special allocations). In the event, total disposals from licensed mines in 1960 were slightly under 2,200,000 tons. There were 465 licensed mines at the end of 1960, compared with 536 at the end of 1959.

Manpower fell during the year from 634,000 to 583,000. The average number of shifts worked in a week was 4.31, compared with 4.28 in 1959. Absence rates were similar to those in 1959—face-workers 16.93 per cent. and for all workers 14.75 per cent. There were more unofficial stoppages in 1960 than in 1959, and more coal was lost on average in each stoppage. Estimated saleable output lost was 1,558,600 tons—585,700 tons more than in 1959.

Open-cast output, at 7,600,000 tons, was 3,300,000 tons less than in 1959, but the production of anthracite and dry steam coal, which were in keen demand, increased by 200,000 tons to 1,300,000 tons. By the end of 1960 the board had invested about £6,000,000 in developing its Westfield open-cast mine in Fife. Most of the coal will go to power stations, but the Scottish Gas Board has erected a Lurgi gas plant on adjoining land with a planned output of 30,000,000 cu. ft. a day which will take coal from the mine under a 20-year contract.

Productivity

Output per manshift increased by 3.7 per cent. over 1959 to 27.9 cwt. There was more mechanization and concentration of workings. Productivity rose in all divisions. In 1960, 38.2 per cent. of the output from the board's mines came from mechanized faces, compared with 31.8 per cent. in 1959 and 8.3 per cent. in 1954, before the major drive to increase power loading began. Last year, 151 manshifts were needed, on average, to win a thousand tons of coal from mechanized faces of all types, compared with 251 shifts where coal was hand-filled. Productivity at mechanized faces was 3.3 cwt. a manshift up on 1959. Over 140 more power-loading machines were in use at the end of 1960 than at the end of 1959.

Mechanization tends to reduce the proportion of large coal in the total output, and the board continued its experimental work to modify the existing types of power loader to increase its yield of large coal. A new drive was made to reduce breakage getting the coal and in moving it from face to wagon.

To meet the need to speed up the withdrawing and setting of face supports to keep pace with the power loader, the board is introducing power-operated supports as rapidly as possible. At the end of 1958, 35 faces were completely equipped with self-advancing powered supports or waste-edge chocks; this number rose to 75 in 1959 and 151 in 1960.

Research and Development

Much research and development work was carried out on new types of power loaders and on mechanizing other underground operations. Field trials of the coal-sensing probe for steering the Midget Miner were carried out at New Lount Colliery in the East Midlands Division. This probe uses gamma radiation to enable seam undulations to be followed precisely by coal-cutting machinery, reducing the amount of dirt in the cut coal, and securing better roof and floor conditions. A method of operating powered face supports by remote control from an adjoining roadway has reached the stage of underground trials.

Higher power demands at collieries have been more than offset by greater efficiency in its use. Costs of power, heat, and light in 1960 accounted for 5.25 per cent. of the total costs of production, compared with 5.46 per cent. in 1959.

The board's research and development work on coal preparation has been directed largely towards cheaper and more efficient processes, and particularly increased automatic control. Fifteen new and 12 extended or reconstructed coal-preparation plants started work in 1960, bringing the total in use at the end of the year to 480.

Since Vesting Date, 288 major schemes have been approved. By the end of 1960, 160 of these schemes had been substantially completed. Ten major colliery schemes and two large coal-preparation schemes were approved in 1960. Six new shafts were completed in 1960, bringing the total number sunk since Vesting Date to 50. Improved stone loading and winding arrangements have made possible the more rapid sinking of shafts than in earlier years.

Some 55 miles of tunnels were driven in 1960. Rates of advance of over 40 yd. a week are now being achieved in some places. Loading equipment of increased capacity is being developed. A self-advancing canopy for mechanized arch-setting in tunnels has been developed and this, together with improved drilling techniques, should give a further increase in rates of advance: the canopy also provides greater safety.

Capital expenditure in 1960 was £85,700,000, of which £48,000,000 was accounted for by major reconstruction schemes at collieries and new sinkings. Total capital expenditure since 1947 has been £963,000,000.

The board's 63 brickworks produced 501,000,000 building bricks, compared with 485,000,000 building bricks in 1959. Productivity improved from 9.6 manhours a thousand bricks in 1959 to 9.3 in 1960, and profits amounted to £725,400, compared with £427,500 in 1959.

Carbonization and Other Processing

The board sold more coke in 1960 than either of the two previous years, but disposals were still some 2,000,000 tons less than in 1955. Largely because of its long-term contracts to supply gas from its coke ovens to Area Gas Boards, it has been difficult for the board to adjust its output of coke to the falling level of demand, and stocks have accumulated. Inland disposals to blast furnaces totalled 1,738,000 tons (636,000 tons more than in 1959), foundries 980,000 tons (121,000 tons more), other consumers 2,109,000 tons (138,000 tons more) and exports 451,000 tons (104,000 tons more), making total disposals 5,278,000 tons (999,000 tons more). Despite record levels of activity in the steel industry, demand for the board's blast-furnace coke still remained well below that in the years before 1957. Changed techniques and higher efficiency in blast-furnace operation have substantially reduced the amount of coke required to produce a ton of pig-iron, and the iron and steel industry at its integrated plants is producing more of its own coke.

During the year the board's coking plants produced 5,842,000 tons of coke and breeze; 339,000 tons of crude tar; 23,000,000 gal. of crude benzole; 61,000 tons of sulphate of ammonia; 14,000 tons of other ammonia products; and 54,000,000,000 cu. ft. of gas. The "Phurnacite" plant produced 637,000 tons, and 26,000 tons of crude tar. "Warmco" production totalled 146,000 tons. At secondary by-product plants 215,000 tons of crude tar and other material were distilled and 30,000,000 gal. of crude benzole and other material were rectified. Briquetting plants produced 78,000 tons of briquettes, 228,000 tons of cobble ovoids, and 424,000 tons of ovoids.

Four of the older coke ovens were closed and other plants were operated below capacity. Output of coke was reduced in 1960 as far as gas commit-

ments allowed, and the net addition to stocks was confined to 267,000 tons, compared with 1,502,000 tons in 1959. In the last four months of 1960, stocks were reduced by 78,000 tons, and at the end of the year stood at 5,089,000 tons. Because it was unlikely that there would be any big improvement in the marketing position in 1961, the board made plans to curtail further its output of coke within the limits imposed by its gas contracts. These plans include schemes to use methane drained from the mines to replace coke-oven gas.

Demand for "Phurnacite" remained keen, and almost all existing stocks were cleared. The capacity of the plant at Aberaman, in the South-Western Division, is to be increased from about 650,000 tons to over 800,000 tons a year; the additional capacity should be in operation before the end of 1961.

Pilot plants were being built during the year to assess the commercial possibilities of two new processes for making premium smokeless fuels. One plant is at Birch Coppice in the West Midlands Division, where high-volatile coal is converted into char by carbonization in a fluid bed, and the char is then briquetted hot. At the other pilot plant, Graigola, in the South-Western Division, high-quality pitch-bound briquettes are made from a blend of anthracite duff and low-volatile coals. Products from both plants are to have market trials during 1961.

The report of the Committee on Coal Derivatives, set up in 1959 by the Minister of Power, was published in August, 1960. The committee considered that, on economic grounds, the Lurgi process of complete gasification (with suitable enrichment of the gas) offered the most promising available method for future expansion in the making of town's gas from coal. The first Lurgi plant to be completed in Great Britain—the Scottish Gas Board's plant at Westfield (Fife)—came into operation at the end of 1960. A plant is under construction for the West Midlands Gas Board at Coleshill (Warwickshire). The board has provided the Gas Council with information about coal supplies and the suitability of sites for a further possible Lurgi plant in the East Midlands. The board is itself building the first Ruhrgas slagging gasifier in Great Britain at Manvers Main in the North-Eastern Division. This plant will make producer gas from low-grade coal.

MANPOWER

The board's decision to curtail production in 1960 necessitated a further reduction in the industry's manpower, which was 634,000 at the beginning of the year. With the agreement of the National Union of Mineworkers some 10,000 men who were already aged 65 and over at the beginning of the year were retired with compensation during the first quarter. Voluntary wastage in the first six months of the year was generally well above the level in the first half of 1959 and was much higher than recruitment. In consequence, total manpower dropped sharply and it became clear that in some places there would be a shortage of men in the second half of the year.

As soon as this became apparent, the board lifted the remaining restrictions on recruitment in most areas and there were special recruiting campaigns where serious manpower shortages seemed likely to develop. Total recruitment was raised to 42,500 for the year, compared with 26,500 in 1959. More boys, re-entrants, and adult newcomers were recruited than in 1959, but the rate at which boys entered the industry was disappointing in some places. In the last months of the year the rate of voluntary wastage fell, but total wastage during 1960 was higher than in 1959. The net reduction in manpower during the year was about 51,000.

About 16,000 men were employed at the 44 collieries which closed in 1960 or were merged with other collieries. The majority of these were re-employed by the board, but some went into other industries; only 250 had not found employment by early 1961. In addition, partial closures and reorganizations affected about 5,000 men, of whom a further 250 remained unemployed at the end of 1960. The board continued to supply information to Government departments with a view to the siting of alternative industries in localities where there might be appreciable long-term redundancy or a permanent reduction in mining employment. The deployment of men between the coal face, elsewhere underground, and the surface showed little change from 1959; 37.8 per cent. were at the coal face at the end of 1960, 42.1 per cent. elsewhere underground, and 20.1 per cent. on the surface.

Wages and Conditions of Service

On July 8, 1960, the National Reference Tribunal awarded that the hours of underground workers and the maximum hours of surface workers should be reduced by an hour a week. It was left to the board and the union to agree upon arrangements for reducing the hours of work. After discussing with the union how to carry the award into effect without increasing costs and losing output, the board introduced arrangements reducing the working hours by 15 min. in each day. The union agreed that the reduction of hours would not be used to justify an increase in piecework rates except in special cases.

The tribunal awarded a wage increase of 5s. a week to daywagemen, with effect from the first full week in September. The board agreed with the unions to increase the wage rates of weekly paid industrial staff by 5s. 6d. a week (12s. in the engineering services), with a further increase of 10s. a week for those normally working underground.

Following the tribunal's award of an increase of 5s. a week to mineworkers the board agreed to revise the cokeworkers' grade structure and to increase daywage rates to bring wages for a normal working week into line with those for surface workers at collieries. The revised rates took effect from the beginning of September, and it was agreed that the revised grade structure should operate from March 6, 1961. Rates of pay for weekly paid

industrial staff at coke ovens were also increased in line with those at collieries.

The board's offers of an increase of 4s. 10d. a week and a reduction from 44 to 42 in weekly working hours for workers at patent fuel and briquetting plants were accepted and became effective in the first week of October, 1960. Colliery canteen workers were granted increases of 5s. a week for men and 4s. a week for women with effect from the first week in September, 1960. The board agreed with the unions on an increase of 15s. 6d. a week for overmen, deputies, and shotfirers, to take effect from the beginning of September.

In 1959, the board reduced its non-industrial staff by over 5 per cent. In 1960, further review of the board's activities and procedures resulted in another saving of nearly 5 per cent. At the end of the year some 50,600 non-industrial staff were in post, compared with 56,500 at the end of 1958.

Pensions and Superannuation

The board, after consultation with the unions, decided to contract its employees, nearly all of whom belonged to the mineworkers' pension scheme or staff superannuation scheme, out of the State graduated pension scheme. At April 5, 1960, the mineworkers' pension scheme fund stood at £52,200,000 and about 113,200 pensions were being paid at an annual cost of £5,200,000. This compares with 79,400 pensions being paid a year previously. At the same date the staff superannuation scheme fund stood at £120,800,000. Some 15,400 pensions were being paid at an annual cost of £2,500,000, compared with 12,900 pensions a year earlier.

New recruits to mining undergo a full medical examination to ensure that they are fit for the job. Two per cent. of the boys examined and 3.9 per cent. of those over 18 were found unfit for mining work. The periodic X-ray scheme, which became fully operative in 1959, aims to provide the safeguard of a regular chest X-ray for all mineworkers. During 1960, 145 collieries employing 131,600 men were surveyed and 83.2 per cent. of the men presented themselves for X-ray. Since the start of the scheme, about 188,000 men have been X-rayed. Collieries will be further surveyed at five-yearly intervals and the correlation of results will provide a measure of the efficiency of dust control in the intervening years. Field research on pneumoconiosis continues to be the principal medical research project sponsored by the board. Research on medical and allied problems cost £137,500 in 1960; there were eight separate projects.

RESEARCH INTO SAFETY

There were 316 fatal accidents in the board's mines in 1960, compared with 343 in 1959, and 1,561 serious injuries, compared with 1,662. Total casualties were 192,910, against 209,444 in 1959. Forty-five men were killed in an explosion at Six Bells Colliery, in the South-Western Division, in June. Recommendations made by HM Chief Inspector of Mines, following a public inquiry into the accident, are being urgently examined by the board. The board's scheme of research into accident prevention at selected collieries in each division, started in 1959, showed promising results: the scheme was extended in 1960 to several collieries in each division. A working party of experts submitted its report on the evidence available in this country and abroad on coal dust explosions; it dealt particularly with the problems attending the explosion hazard from coal dust in wet conditions and has been widely circulated within the industry. The recommendations are being put into effect.

Much research was carried out to improve safety. Methane drainage was further developed, and by the end of 1960 there were 80 installations draining some 172,000,000 cu. ft. of methane a week; of this total, some 40 per cent. was used at collieries or sold to the gas industry.

Training and Education

In 1960, 3,700 adults and 9,000 boys completed preliminary training, compared with 2,400 adults and 10,500 boys in 1959. Seven thousand men—3,600 less than in 1959—were trained for facework. More craftsmen will be needed as the industry becomes increasingly mechanized. Advantage was taken of the larger number of school-leavers in 1960 to recruit some 2,400 apprentice mechanics and electricians—500 more than in 1959. Plans were made to increase the intake to about 3,000 in 1960. Various changes were introduced in the craft apprenticeship scheme to ensure a high standard of training and technical education.

During 1960, eight pithead baths were completed, bringing the total to 685. More than 95 per cent. of mineworkers can now bathe at the pithead, compared with about 60 per cent. in 1947. There were 655 colliery canteens in use. The board made grants of £1,180,000 in 1960 to the Coal Industry Social Welfare Organization, which has been responsible since 1952 for the social welfare of all employed in the industry and their families. Under the supplementary building programme of the Coal Industry Housing Association, 389 houses were built in 1960.

Mechanical Handling Exhibition, 1962

For the next Mechanical Handling Exhibition, to be held at Earls Court, London, from May 8 to 18, 1962, the organizers have added another 25,000 sq. ft. to the normal exhibition area, increasing the total available space to 525,000 sq. ft. Space for the 1962 event is already almost completely taken up.

Construction Equipment at Crystal Palace

First major exhibition to be held at Crystal Palace for 25 years will be the International Construction Equipment Exhibition from June 15 to 24. The exhibition, which is to be opened by Mr. Reginald Maudling, President of the Board of Trade, will provide the most comprehensive display ever assembled of construction equipment for the building and civil engineering industries. The site, made available by the London County Council, offers some 25 acres of exhibition area including that formerly occupied by the 1851 Exhibition Palace and also the terraced gardens designed by Sir Joseph Paxton a century ago. Equipment on display will range from the smallest hand mechanical power tools to the largest earth-moving and road-making machinery, much of which will be seen in action on the two proving grounds.

BRITISH IRON AND STEEL INDUSTRY

Translation Service

FOLLOWING is a list of some new translations available from the Iron and Steel Institute under its translation service scheme. Translations are all classified by numbers, and these should be addressed to the institute at 4, Grosvenor Gardens, London, S.W.1.

1848: "Effect of Drawing Temperature when Drawing Steel Wire.—I." T. NISHIOKA. Nippon Kinzoku, 1958, 22 (5), pp. 225-229. £3.

1852: "Technical Problems in the Construction of Power Supply Systems in Integrated Iron and Steel Works," H. ENGELHARDT. Stahl Eisen, 1960, 80, July 21, pp. 1000-6. £4 15s.

1875: "Gas Leakage Tests on Casing Joints Under Conditions Closely Resembling Those Met on Site." V. HAUK. Erdöl Zeitschrift, 1959 (12), pp. 498-504. £4 15s.

1979: "A Modern Continuous Pickling Process (Spray Pickling)." ANON. Draht, 1960, 11, Feb., pp. 59-60. £1 10s.

1991: "Use of Radioisotopes in Metallurgy and Metal Physics" (with bibliography; 317 references). I. S. KULIKOV. Neue Hütte, 1960, 5, June, pp. 348-354; July, pp. 420-425. £7 5s.

1995: "Force- and torque-measuring devices for rolling mills." T. DIETRICH. Stahl Eisen, 1960, 80, Mar. 17, pp. 372-74. £3.

2146: "Preparation of Iron Single Crystals by Zone Melting." H. HILLMAN and A. MAGER. Z. Metallk., 1960, 51, Nov., pp. 663-666. £3.

2040: "Deoxidation of Iron by Melting Under Vacuum." P. TURILLON. Rev. Mét. Mém. Sci., 1960, 57, Sept., pp. 649-657. £3 5s.

2059: "Determination of Gases in Metals by the Hot-extraction Process Using Gas Chromatography." R. LESSER and H. GRUBER. Z. Metallk., 1960, 51, Sept., pp. 495-501. £3 15s.

2135: "The Embrittlement of Steel by Absorption of Atomic Hydrogen." O. WERNER. VDIZ., 1959, 101, Oct. 1, pp. 1303-4. £2.

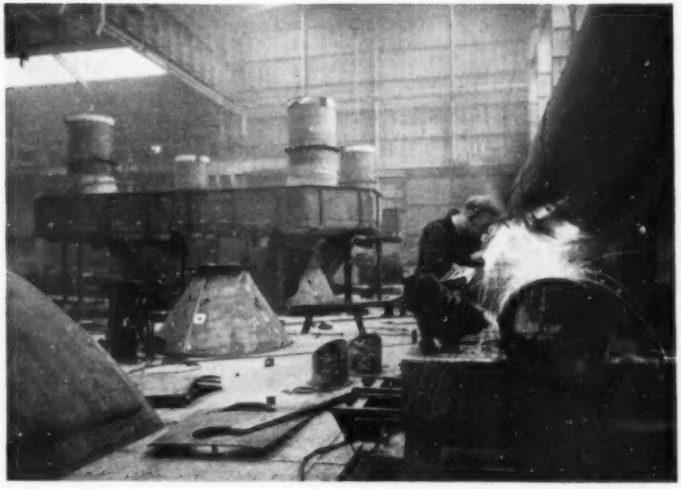
1710: "The Proper Dimensioning of Ball and Roller Bearings for Stands in Continuous Section, Wire, and Strip Mills. H. PAUELS and H. H. ROHDE. Stahl Eisen, 1960, 80, Mar. 31, pp. 417-428. £8.

1761: "On the Causes of Wear of Tools." G. OSTERMANN. Industrie-Anzeiger, 1959 (62), pp. 13-21. £6 10s.

1836: "Investigations into the Recrystallization of a Ferritic 27 per cent. Cr Steel with Special

(Continued overleaf)

Plant for Ravenscraig



A TOP platform section for the new No. 3 blast furnace for the Ravenscraig Works of Colvilles, Limited, is seen here in the process of assembly at the Stockton Works of the builders, Ashmore, Benson, Pease & Company, Limited.

All three blast furnaces for Ravenscraig are being supplied by that company. Each of the furnaces has a hearth diameter of 25 ft. 9 in. and is designed to produce 1,000 tons of basic iron per day.

Along with the No. 1 blast furnace, comp'eted in 1957, Ashmore, Benson, Pease also supplied ore-bridge and stock-yard equipment. The stockyard, 800 ft. by 200 ft., is equipped with what is believed to be the fastest man trolley orebridge outside the US. The man trolley can cross-travel on the ore-bridge at the rate of 1,000 ft./min. and lift 13 tons of ore with each bite of the grab.

Reference to Annealing Time" (with bibliography, 35 refs.). H. BORCHERS, *et al.* Arch. Eisenhüt., 1960, 31, Mar., pp. 177-182. £4.

1900: "Effect of Obstructions to Flow (Liquids) in the Intake upon the Heat Transfer in Tubes and Annular Clearances." G. GRASS. Atomkern-Energie, 1958, 3 (10), pp. 382-388. £4 15s.

1944: "The Weighing of Goods Wagons Particularly of Those in Motion on Inclined Rail Weighbridges." E. MASSUTE. ETR Sonderausgabe 11, 1959, Sept., pp. 57-67. £6 5s.

1981: "Mathematical Analysis of the Degassing of Specimens Held Under Vacuum at Constant Temperature." J. CALMETTES, *et al.* Rev. Mét. Mém. Sci., 1960, 57, Sept., pp. 659-75. £4 15s.

2060: "State of Knowledge on the Properties of Steels for High-pressure Hydrogenation Vessels." I. CLASS. Stahl Eisen, 1960, 80, Aug. 18, 1117-35. £8.

2065: "Choice of Materials for the Parts of High and Super High Pressure Accessories Subjected to Wear." A. V. RATNER and L. G. LEONOVA. Teploenergetika (Moscow), 1960, Dec., pp. 14-18. £3 10s.

2075: "Mechanism of the Electrical Breakdown of Metal Suspensions in Liquid Dielectrics." L. G. GINDIN, *et al.* Dok. Akad. Nauk SSSR, 1950, 74 (1), pp. 49-52. £2 5s.

2076: "Contributions of German Steelworks to the Development of Heavy Forgings." H. GUMMERT. Stahl Eisen, 1960, 80, Oct. 27, pp. 1517-1524. £5 10s.

2094: "Methods of Influencing the Oxygen Content of Soft Open-hearth Steels During Refining." W. HESS. Stahl Eisen, 1961, 81, Jan. 19, pp. 103-110. £4 15s.

2095: "Comparison of Results Obtained by Subjecting Mild Steels to the Cup-forming and the Erichsen Deep-drawing Tests." A. KRÜGER. Colloquium on the shaping of sheet metal, International Deep Drawing Research Group, Société Française de Mét., Paris, May 23-25, 1960. £5 10s.

2099: "The Obtaining of Niobium Nickel Alloys by the Reduction of Niobium Pentoxide in the Presence of Nickel." G. GRUBE, *et al.* Zeitschrift für Elektrochemi u. Angewandte Physikalische Chemie, 1939, Dec., pp. 881-4. £3.

2105: "The Influence of Small Amounts of Nickel and Chromium on the Mechanical Properties of Steel." T. OHTAKE, *et al.* Tetsu to Hagane, 1959, 45, Sept., 1089-92. £8.

2109: "The Importance of Noise Measurement for the Effective Abatement of Noise Nuisance in the Iron and Steel Industry." G. SCHULZ. Stahl Eisen, 1961, 81, Feb. 16, pp. 220-8. £5 15s.

2112: "Control of Sinter Plant Operation." B. WEILANDT and N. PETRUSCH. Stahl Eisen, 1961, 81, Feb. 16, pp. 235-38. £3 10s.

2113: "Report on and Experience with the Measurement of Blast-furnace Lining Wear by Means of Radioactive Isotopes." R. FLOSSMANN and R. GEIDEL. Stahl Eisen, 1960, 80, Nov. 24, pp. 1753-59. £4 10s.

2131: "The Thickness of the Zinc Coating and the Corrosion Resistance of Hot-dip Galvanized Parts." R. HAARMANN. Metalloberfläche, 1959, 13, Nov., pp. 342-345. £2 10s.

2144: "Manufacture and Quality of Special Steel Tubes for High Temperature and High Pressure Service." K. HARADA. Sumitomo Metals (Osaka), 1960, 12, Apr., pp. 80-90. £10.

2152: "Physical Problems in the Conveying of Solid Particles in Liquids and Gases." W. BARTH. Chemie-Ingenieur-Technik, 1960, 32, Mar., pp. 164-171. £3 15s.

2153: "Study with Models of the Speed of Mass Transfer Between Metal and Slag in the Making of Steel" (with discussion). P. ROCQUET and J. ADAM-GIRONNE. Rev. Mét., 1960, 57, Dec., pp. 1081-9. £3 10s.

2154: "The Screening of Hot Sinter." L. M. RUDAKOV and J. J. GORSHTEIN. Metallurg, 1961, 6, Feb., pp. 3-4. £1 10s.

DEVELOPING AUSTRALIA'S IRON-ORE RESOURCES

GROWING importance which is being attached to Australia's iron-ore industry, particularly in the field of exports, is indicated by plans announced by the Japanese steel industry to send a team of experts to Western Australia in the near future to explore the possibilities of developing iron-ore resources in the territory. A programme for the export of iron ore to Japan, approval for which has yet to be obtained from the Commonwealth Government, has been prepared by the State Government.

Subject to confirmation, proposals cover the export of 1,000,000 tons of ore annually over a period of 15 years from Mount Goldsworthy, and, although no tonnages have been announced, exports may be made from the Tallering Peak deposits, where resources are estimated at 2,000,000 tons. Matters of grade, price delivery terms for the ore transport, and harbour facilities have yet to be finalized.

It is expected that most of Australia's iron-ore exports will be from comparatively small deposits in Western Australia. The Mount Goldsworthy deposit has been drilled recently and the area investigated by the Western Australian Department of Mines. The ore is high grade and the site reasonably accessible to an ocean shipping point.

The Minister for Development, Senator Spooner, has stated that in order to protect Australia's industrial future, the export of ore from certain defined areas in Western and South Australia has been prohibited, as these consist of major deposits useful to the local steel industry.

Austrian Rolled Steel Products

Deliveries of rolled steel products in Austria during 1960 totalled 2,190,000 tons, compared with 1,700,000 tons in 1959. They included 231,000 tons of special steel products, against 185,000 tons in the previous year, of which 131,000 (111,000) tons were exported. More than half the special steel exports, namely, 79,000 (63,000) tons were exported to countries within the OEEC, the largest customers being Germany (23,000 tons), Italy (20,000 tons), and Switzerland (16,700 tons). Exports to Eastern bloc countries, including the USSR, amounted to 28,000 tons (24,000 tons in 1959) and to oversea countries 19,000 (20,000) tons.

New Literature

SOME of the house magazines, catalogues, booklets, and other publications received are mentioned below. Readers wishing to obtain a copy of any of the items should write to the address given, at the same time mentioning this journal.

WALLACETOWN ENGINEERING COMPANY, LIMITED, Viewfield Road, Ayr, Scotland—Various items of "Wecol" electrical equipment are described briefly in a new pamphlet.

INSTITUTION OF WORKS MANAGERS, 196, Shaftesbury Avenue, London, W.C.2—A supplement on "Factory Heating in the Sixties" is included in the June issue of Works Management (2s. 6d.).

OPTOSHIELD, LIMITED, 146, Clerkenwell Road, London, E.C.1—Technical data sheet No. 2 describes the Ampco range of spark-resistant tools, of which the company is the sole distributor in Great Britain. Over 400 tools are available.

THE ENGINEERING CENTRE, Stephenson Place, Birmingham 2—Further news of the new Engineering and Building Centre, which will be housed in the former Masonic Hall, Birmingham, from January, 1962, is contained in the May issue of News Letter.

INCANDESCENT HEAT COMPANY, LIMITED, Cornwall Road, Smethwick, Birmingham—"Forced Circulation Air Heaters," a paper by C. J. V. Denning, which was presented at a joint meeting of the Society of Furnace Builders and the Society of Glass Technology, is the subject of the company's reprint No. 509.

BRITISH TIMKEN, Duston (Northants)—Timken, the monthly magazine published for the employees of the Timken Roller Bearing Company, always contains a fair measure of pages devoted to news of the activities of the UK division. The two sections blend happily and provide interesting reading. The May number is now available.

NATIONAL COAL BOARD, Hobart House, Grosvenor Place, London, S.W.1—Coal Magazine (4d.) appears in its familiar format for the last time with the June issue. In July it will appear not as a magazine, but as a newspaper, and there will be separate editions for the various Coal Board divisions. The new paper will sell at 3d. In its present style, the magazine has done a good job and it will be missed. Whitwell Colliery is featured in the June issue in an article by Edwin Oakes, "Whitwell Toasts the Mawco."

NATIONAL SOCIETY FOR CLEAN AIR, Field House, Breams Buildings, London, E.C.4—A new feature of the Clean Air Year Book, 1961 (2s. 6d.), which has just been published, is a table of local authorities on the "black areas" which shows the progress they have already made in the setting up of smoke control areas under the Clean Air Act, their eventual targets, and the dates by which they expect to reach them. The table shows, by empty spaces, the authorities which so far have made no progress. The book is a mine of information about air pollution and its prevention.

DENVER EQUIPMENT COMPANY, 15/17, Christopher Street, London, E.C.2—The Sindicato Minero Paco-cocha S.A. mill is a 125-ton per day copper, silver, lead, zinc, selective flotation mill. It is located only three hours by road from Lima, Peru, in the high Peruvian Andes at a height of about 14,800 ft. The mill design, based on metallurgical tests conducted by the Denver Equipment Company, incorporated features which resulted in a low construction cost, and provides the future expansion to double initial capacity. The project is featured in the March-April issue of Deco Trefoil.

ALCAN INDUSTRIES, LIMITED, Bush House, Aldwych, London, W.C.2—A diamond jubilee referred to in the May issue of Aluminium News concerns the discovery of a commercial method of making aluminium. Seventy-five years ago, Charles Martin Hall, of the US, and Paul L. T. Héroult, of France, working independently of each other, discovered the electrolytic method of making aluminium that is in use around the world today. In doing so they lifted aluminium from its role as a precious metal into its present role as a metal both practical and highly versatile in the service of mankind.

THOS. W. WARD, LIMITED, Albion Works, Sheffield—Two new booklets have been published. "Talking About Wards" sets out to present an outline of the company's activities together with those of its subsidiaries and associates. It is designed to answer the many questions likely to be asked in conversations which begin: "Talking about Wards, tell me . . . ?" A 24-page, fully illustrated booklet, "Factory Planning and Installation by Wards F.P.I. Department," gives a comprehensive picture of this field of the company's activities. The first part of the publication illustrates the large contracts which have been carried out for the Atomic Energy Authority in the fabrication of pipework, plant installation, graphite laying, etc., while the second part describes the plant and machinery installation service which is in constant demand today, when many firms and factories are either reorganizing existing space, expanding, or moving to new premises.

FORTHCOMING EVENTS

JUNE 14

Institution of Production Engineers:—Meeting in the Large Lecture Theatre, Engineering Faculty, University of Bristol, at 6.30 p.m. Viscount Nuffield Paper: "Some Aspects of Engineering Progress," by Sir Willis Jackson, FRS.

Midland Counties Institution of Engineers:—Annual golf competition at the Sherwood Forest Golf Club, Mansfield, at 2 p.m.

JUNE 15

North of England Institute of Mining and Mechanical Engineers:—Meeting at Neville Hall, Newcastle-upon-Tyne 1, at 2.30 p.m. "A Hydro-electric Project," by H. F. Coleman.

Norway's Iron and Steel Output

The following details of iron and steel production in 1960 are announced from Oslo:—Pig-iron, 373,234 tons (337,764 tons in 1959); ferro-silicon, 167,142 (126,945) tons; other ferro-alloys, 172,558 (157,772) tons; crude steel, 478,4497 (426,146) tons; iron ore, 1,812,403 (1,773,012) tons.

British Association Annual Meeting

The 123rd annual meeting of the British Association for the Advancement of Science will be held in Norwich from August 20 to September 6, under the presidency of Sir Wilfrid Le Gros Clark, FRS, Professor of Anatomy at the University of Oxford. The preliminary programme, including titles of addresses by the presidents of the various sections, has now been published.

Orders Placed

Civil Engineering Work at Tinsley Park

CONTRACT for the major civil engineering work for the £26,000,000 development at Tinsley Park, Sheffield, of the English Steel Corporation Limited, has been awarded to John Mowlem & Company, Limited, London, S.W.1. The work covers foundations for buildings, plant, roads, drainage, rail tracks and some building work, and the estimated value is over £4,000,000.

At present John Mowlem is completing the preliminary earth moving on the site, which has involved moving 3,000,000 cu. yds. of material in under six months. The plant is scheduled to start operating in the latter part of 1962, and the major part of the civil work has to be completed in 16 months. This will involve placing some 160,000 cu. yd. of concrete at a rate of 15,000 cu. yd. per month, constructing 15 miles of rail track and 3½ miles of road.

EXCHANGE CONTRACT worth £1,500,000 for rolled steel products was signed with Russia by Harlow & Jones, Limited, London, S.W.1, at the Moscow Trade Fair.

AN ORDER, valued at about £300,000, has been received by Richardsons, Westgarth & Company, Limited, from the Central Electricity Generating Board, for a condensing plant for use with a 300 mW turbo-generator at the West Thurrock power station.

TWO ORDERS, worth together £500,000, for road rollers, motor graders and dumpers, have been received by Aveling-Barford, Limited, Grantham. The Public Works Department, Malaya, has ordered 106 machines of all three types, and 17 machines are being supplied to Marengo, SA, the Argentine civil engineering contractors.

IN ADDITION TO the work it is already carrying out for screening installations for the Aigas & Kilmorack, Beannachran and Garry Ericht projects, Plowright Bros., Limited, Chesterfield, has now received from the North of Scotland Hydro Electric Board, orders valued at approximately £25,000 for screens and screen guides for the Inverawe section of the AWE project.

ORDER FROM Australia for 220 kV. switch gear for the Hazelwood Power Station of the State Electricity Commission, Victoria, has been received by Associated Electrical Industries, Limited. The contract, placed with Associated Electrical Industries (Pty), in Australia, is worth £510,000 sterling and is for the supply and erection on the site of a complete switch yard. Part of the equipment will be made in the UK.

CONTRACT FOR the installation of tower purifiers to deal initially with 10,000,000 cu. ft. of gas per day at the Etruria gas works, Stoke-on-Trent, has been placed by the West Midlands Gas Board with Newton, Chambers & Company, Limited. When completed the project is expected to cost about £250,000. The towers will be sufficiently high to enable additional containers to be installed at a later date to increase output capacity.

FOR INSTALLATION in the Vales Point power station of The Electricity Commission of New South Wales, nine Allen-Stoeckicht gear units for booster and boiler feed pump drive have been ordered by Mather & Platt, Limited, Manchester, from W. H. Allen Sons & Company, Limited, Bedford. Two Allen-Stoeckicht epicyclic reduction gear units for circulating-water pump drive for installations in the Komati power station of KSB Pumps, Limited, have also been ordered from Allens by Dowson & Dobson, Limited, South Africa.

FIRST SWITCHGEAR for the new 400,000 V Supergrid is to be supplied to the Central Electricity Generating Board by the English Electric Company, Limited, and will be installed at the West Burton (Notts) power station on the supergrid. Worth about £1,500,000, the order will cover 13 35,000 mVA air blast circuit breakers, together with the power-operated isolators and other apparatus to form a complete duplicate busbar switching station.

BROOKHIRST IGRANIC, LIMITED, a company in the Metal Industries Group, is to supply electrical controls for the Deephams sewage purification works of the East Middlesex main drainage scheme. The order is valued at £77,000. Further orders totalling £132,000 have been received from John Lysaght, Limited, and AB Svenska Flakfabriken, for the supply of motor control centres for the new Ford Motor Company, Limited, works at Haleswood (Lancs).

WORTH £3,250,000, a contract for two worsted spinning mills has been placed by Soviet Technoproimport with a group of UK textile machinery manufacturers, for delivery to Russia. The order is to be completed within a year. Manfacturers concerned in the deal are: Prince-Smith & Stells, Limited, Platt Bros. & Company, Limited, a member of the Stone-Platt Limited, group of companies, Mather & Platt, Limited, and Sellers & Company (Huddersfield), Limited.

SCOW's Moscow Fair Orders Totalled £1,400,000

FOR early delivery to their car industry, the Russians placed a second large order with the Steel Company of Wales, Limited, before the British Trade Fair closed last weekend. The latest order, for 10,000 tons of sheet, brings the total value of these two contracts to over £1,000,000. During the period of the Moscow Fair the company has concluded business with the Russians to the value of £1,400,000.

Assistant export sales manager of SCOW sheets division, Mr. M. J. Hudson, who negotiated the new order, said on his return to London, "This is further evidence of our excellent relationship with the Soviet buying authorities. We were again impressed with the keen appreciation of our Soviet counterparts of the international steel situation and their own requirements."

£1,000,000 Broken Hill Order for Oxygen Steel Plant

CONTRACT worth £1,000,000 has been placed by the Broken Hill Proprietary Company, Limited, with Noyes Bros., Limited, Melbourne, for part of its new basic oxygen steelmaking plant being installed at Newcastle, New South Wales. The contract is for the supply and erection of a gas-discharge system, and is the second major order gained within a week by Noyes Brothers, which earlier obtained a £3,500,000 contract from Australian Portland Cement, Limited, for a new rotary cement kiln and other equipment.

Noyes Brothers was formerly a subsidiary of N.K.S. Holdings, Limited, which sold its interest to Crompton Parkinson, Limited, in March last year.

IRON AND STEEL TRADE

ORDER-BOOKS are now more realistically related to present steel usage and have been shorn of the added pressure which continued throughout last year when consumers were ordering considerably in excess of normal requirements. Orders have eased, for the most part, in standard sections and joists, but in no sector is the gradually expanding capacity of the finishing trades under extreme pressure.

Pig-iron

Outputs of pig-iron are being maintained at the average annual rate of 15,000,000 to 16,000,000 tons. Supplies of all grades are sufficient to satisfy customers' needs and, generally, there are tonnages to spare. Basic pig-iron is being taken up by the steelworks in substantial quantities.

The low phosphorus pig-irons are, comparatively, in heaviest demand and, although one or two furnaces are still limited in production, other irons in similar quality and analysis are available to cover any deficiencies. Hematite and high phosphorus irons are in good supply.

Ferro-alloys

Little change is noted in the demand for ferro-tungsten, a steady level of activity being maintained. Ferro-molybdenum is active and there is a fair demand for ferro-vanadium. The 45 per cent. Si and 75 per cent. Si grades of ferro-silicon continue to attract support while silicon metal is of slight interest.

Ferro-titanium is receiving reasonable attention and ferro-niobium is active. Chromium metal is in fair request, but manganese metal is quiet.

Semi-finished Steel

Steady demand is being made for the products of the re-rollers, but these are, generally, well below previous levels. Reinforcing rods and bars continue in heavy request. Arrears of work have now been liquidated and production depends on day-to-day arisings of orders for small bars, light sections, and strip.

With the work currently arising most of the re-rollers are able to offer prompt rollings and they could undertake much more business than is now forthcoming.

Finished Steel

The general picture is one of stocks being reduced so that although there is a reasonable call in some sections of the trade it is by no means as heavy as it was. Capacity is still available for small angles, flats, rounds, etc., for inclusion in current programmes. As more new plant becomes operative the platemakers are getting ahead with the reduction of outstanding commitments and are accepting orders with reasonable delivery dates. There is little change in the situation so far as the makers of cold reduced sheet and strip, good commercial quality bright drawn bars, and colliery requirements are concerned.

FOR 25 YEARS the industry's trade association, the Vitreous Enamellers' Association has merged with the Vitreous Enamel Development Council, the industry's promotional body. Its members, in the association's new role, will form a jobbing, signs, and general division of the council, bringing the number of the council's divisions to five.

Growth in World Demand for Steel Scrap

WHILE the continued growth of raw steel production has increased world requirements for scrap, supplies are being covered by national production and trade between countries, delegates reported at the recent meeting of the council of the scrap iron and steel section of the Bureau International de la Récupération (BIR) in Rome. Future prospects for the market appeared to be fairly favourable, and in nearly all countries prices had become stable. Concern was expressed at the difficulty of finding labour, particularly in Switzerland and Germany.

The meeting, under the chairmanship of Mr. H. Adloff (Germany), section president, heard a report on the market situation of scrap originating from shipbreaking by M. Champeix (France), who stressed the importance of this branch of the industry for supplying particular qualities of scrap for steelmaking.

At the meeting of the non-ferrous metal section council, Mr. Austin (Great Britain), reported on representations made to the British Government from the European Free Trade Area seeking a relaxation of export regulations. The question of setting up a liaison committee with the European Economic Commission which would include the whole of the European non-ferrous metal trade was raised, but no final decision arrived at. Delegates reported on market developments in their respective countries, which showed that trade was going through a satisfactory period.

Work on the publication of an International Classification of Non-Ferrous Scrap Metal is expected to be completed in the next few months.

Export Achievement by Geo. Angus

ON his recent visit to the oil seal division plant of Geo. Angus & Company, Limited, at Wallsend-on-Tyne, the Minister of Power, Mr. Richard Wood, congratulated the company on its record of export achievement.

In 1960, the company's direct exports increased by over 33 per cent. above the previous year and represented 25 per cent. of the total turnover. In the first four months of 1961 they have continued to rise still further, and show an increase of 29 per cent. over the 1960 figures.

"PARTNERS IN PROGRESS," a booklet describing its apprentice training scheme, has been produced by Alexander Stephen & Sons, Limited, Glasgow, shipbuilders and engineers, to mark the occasion of a visit by the Duke of Edinburgh to the company's works' school during Commonwealth Technical Week.

Coalfield News

"Closure" of Dinnington Colliery Denied

RUMOURS that Dinnington Main Colliery, near Rotherham, was to be closed in the next 10 years were denied by a spokesman of the North-Eastern Divisional Coal Board last week. The rumour was voiced at a meeting of Dinnington Parish Council by Cllr. A. Harvey, who said he had been told the colliery was exploiting its last stretch of the Barnsley Seam, and that the pit might possibly be exhausted within the next 10 years with no hope of further seams being opened.

Mr. W. E. Lane, general manager of the No. 1 (Worksop) Area, said the rumour was "quite untrue." It would be at least another 20 years before the Barnsley Seam ran out, and there was a great deal of coal in other seams still to be worked. Dinnington, he added, was "a good pit and a happy pit."

ANNUAL GALA DAY for South Yorkshire miners will be held at Worsbrough Park, near Barnsley, on Saturday, July 15.

ENGINEER AT Ushaw Moor Colliery, Co. Durham, Mr. William H. Pendrich has retired after 41 years in the mining industry.

RETIRING BOWHILL (Fife) Colliery workers, who had each spent 50 years' in the coal industry, were entertained recently by the Bowhill Colliery Welfare Social Club.

UNDERMANAGER at Nook Colliery, Astley (Lancs), Cllr. Joseph Jolley has been elected chairman of Blackrod (Lancs) UDC for the year 1961-62. This is the fourth time in his 22 years' service with the council that he has held the office.

THE 180-FT. HIGH boring tower of the National Coal Board was moved on Tuesday from a position south of Sunderland to a new position 2¼ miles due east of South Shields to take borings to prove seams in relation to Westhoe Colliery.

PRODUCTIVITY IN the Durham Division of the NCB shows an encouraging increase over 1960. OMS in the first 21 weeks of this year averaged 23.17 cwt. against 22.12 cwt. in the same week last year. At the face, OMS was 66.03 cwt. (64.73 cwt.).

HIGHLIGHT OF an exhibition held by Buckhaven (Fife) Technical College, in connection with Commonwealth Training Week, was a scale model of a colliery, complete in every detail, made by pre-apprenticeship trainees and Cities and Guilds mining students, aged 15 to 20.

A VERDICT OF Misadventure was returned at a Royston inquest last week on a Hungarian shaft sinker, Mr. Frank Juhasz (22), who fell 173 yds. down a shaft at Monkton Colliery. Juhasz was said to have been wearing harness when he fell, but not to have had it secured to anything.

VERDICT of Accidental Death was returned by a jury at the Arnold (Notts) inquest on Mr. Robert Dunn (34), locomotive driver, who died in an accident at Caverton Colliery when his locomotive ran down an incline after he had left it to make an adjustment to a ventilation door.

AFTER A 30-YEAR campaign for a swimming pool, the mining village of Bowhill (Fifeshire), is hoping that Mr. Abe Moffat, president of the Scottish Area of the National Union of Mineworkers, will be able to get financial backing from the Coal Industry Social Welfare Organization, which has recently agreed to the scheme in principle. The pool will cost about £30,000 of which £6,000 has already been raised by the Bowhill miners.

INTRODUCTION of four six-hour shifts a day was urged on Monday by Mr. Will Whitehead, president of the South Wales Area of the National Union of Mineworkers, as "the only way to make working conditions more attractive in the mines." There must be a revolutionary change in the shift system if the board was to continue with more mechanization, he added.

NCB CLERK Mr. D. Whigham, of Glasgow, was the winner of the "Clyde Award," presented by Glasgow Junion Chamber of Commerce during Commonwealth Training Week. To gain the award, which consists of a visit to Canada, he had to arrange in order of importance a list of 10 advantages training would bring him, and tell in 25 words why he would like to win the competition.

AT THE WORKSOP (Notts) inquest on Mr. Albert Henry Steele (60), a miner who was killed underground at Harworth Colliery, near Doncaster (Yorks), the jury returned a verdict of Accidental Death. The coroner, Lt.-Col. H. J. Thompson, said that although there was no question of gross negligence, certain matters regarding safety devices might be the subject of inquiry by the proper authorities.

AMEME's New President Mr. J. Anderson

NEW president of the Association of Mining Electrical and Mechanical Engineers, who took office at the annual meeting of the association at Harrogate, on Wednesday, Mr. James Anderson is chairman and managing director of Anderson, Boyes & Company, Limited, mining machinery manufacturers, of Motherwell.

MR. J. ANDERSON

Mr. Anderson, whose father, the late Mr. Alexander Anderson, was AMEME president in 1914 and first president of the West of Scotland branch, was educated at Glasgow Academy and the Royal Technical College, Glasgow, and served his engineering apprenticeship with Anderson, Boyes. For long an active member of the Association, he is a Fellow of the West of Scotland Branch, of which he was president from 1952 to 1954. He is a past-president and executive committee member of the Council of Underground Machinery Manufacturers, and vice-chairman of the Federation of Associations of Colliery Equipment Manufacturers.

His many activities in other spheres of industial life include the presidency of the Scottish Engineering Employers' Association, and membership of the management board and central conference committee of the Engineering Employers' Federation, while his interest in young people is reflected in appointments held on various Scottish education and training bodies. Made MBE in 1949, Mr. Anderson is also a JP, and a member of the British Institute of Management and the Institute of Directors.

THE COAL TRADE

HOUSEHOLD trade has now fallen off and some merchants, having difficulty in disposing of their allocations, are requesting a temporary curtailment of supplies. Similar quiet conditions apply even to the smokeless fuels, most domestic consumers being quite confident that as and when they want the scarcer brands they will, somehow, be conjured up by the merchants. Industrial steam-raising fuels are in good demand but both supplies and deliveries are, generally, all that can be asked for.

WEST MIDLANDS

The demand for house coal has weakened over the past week and merchants are now canvassing for new business. The first rush of orders for stocking have largely been executed and merchants are busy contacting householders who have not so far laid in stock. Depot stocking, together with demand to meet current consumption, is still large enough to absorb almost all of the production of house coal from the Cannock and Warwickshire pits. Demand, is not sufficient however to clear all qualities from North Staffordshire pits.

Retail prices are in line with the reduction in pit prices and a wide range of qualities are on offer, together with attractive terms of payment. Premium smokeless fuels are in good request and most merchants have ready outlets for best anthracite qualities. Some of the less reliable grades of anthracite are on offer in small parcels. There is now much less delay in the execution of orders for Welsh boiler nuts and Phurnacite, and orders are being accepted from new customers to a limited extent. Very quiet conditions exist in the coke market. Hard coke nuts are easy, and producers are not able to get enough orders to clear daily production.

Contracts for industrial coals are being renewed for quantities of the order of last year, and, in a few instances, additional business has been entered. Restocking is now in progress and targets are not less than a year ago. Most buyers are able to obtain DS nuts and beans to requirement, and steam raising smalls are usually available without difficulty. Power station requirements are heavier, but supplies are usually available to match demand. The market for hard coke remains patchy. Blast furnace coke is the strongest feature and forward requirements are higher than a year ago. The demand for general industrial coke is not as good as a month ago. Foundries enjoy a high level of business activity, and their requirements of foundry coke are well up to peak loads.

Eire's Coal Supplies from UK to Go Up 35s. a Ton

PRICE of domestic coal supplies from Great Britain to Northern Ireland is to be increased by 35s. a ton, according to Northern Ireland sources.

Northern Ireland coal importers are expected to welcome this increase, as it eliminates the price differential between National Coal Board supplies to Northern Ireland and the Republic, and should put an end to illegal cross-border traffic.

ASSOCIATED BRITISH ENGINEERING, LIMITED—Mr. S. R. Hogg has been elected chairman.

Coal Output 5.5 Per Cent. Up on 1961 Average

WITH a considerably reduced labour force—572,790 compared with 605,620 a year ago—some 60,000 tons more coal was produced last week. At 3,964,800 tons, output was 1.4 per cent. up on last year and 5.5 per cent. up on the average for the first 22 weeks of this year.

Undistributed coal stocks are still dwindling and in the week ended May 27 dropped to 23,134,000 tons, compared with 33,763,000 tons last year. Consumers' stocks are fairly static at just over 13,100,000 tons.

There were 572,790 wage-earners on colliery books on May 27, against 605,620 on May 28, 1960, the numbers engaged at the coal face being 214,620 and 231,400 respectively. Total absenteeism (all workers) in the week ended May 27 was 16.61 per cent., compared with 13.38 per cent. in the week ended May 28, 1960. Output at the face was 4,012 tons and overall 1,339 tons in the week ended May 28, compared with 3,958 and 1,410 tons in the week ended May 28, 1960.

The following table gives (in tons) the provisional figures of output of saleable mined coal by division in the week ended June 3, and the tonnage lost through disputes:—

Division.	Week ended June 3, 1961.		Week ended June 4, 1960.
	Total output.	Tonnage lost.	Total output.
Scottish ..	355,000	10,000	357,000
Northern (N&C) ..	247,000	—	243,000
Durham	464,000		461,000
North-Eastern ..	844,000	17,000	803,000
North-Western ..	241,000	8,000	269,000
East Midlands ..	923,000	2,000	870,000
West Midlands ..	283,000	—	278,000
South-Western ..	373,000	1,000	387,000
South-Eastern ..	27,000	—	31,000
Great Britain—			
Deep-mined coal ..	3,757,000	38,000	3,699,000
Other deep-mined (including licensed mines) ..	39,000	—	45,000
Open-cast coal ..	169,000	—	163,000
TOTAL ..	3,965,000	38,000	3,907,000

A seven-week oversea survey is being undertaken by Mr. JAMES DALLAS, managing director of British Mono-Rail, Limited, Brighouse (Yorks), primarily to expand the markets in South Africa, Australia, and New Zealand. He will also visit the USA to study the latest developments in the mechanical handling field. He leaves London on Monday for South Africa.

Board Changes

Mr. D. W. Hammond Leaves Jessop-Saville

AFTER a life-time in the steel industry, Mr. D. W. Hammond has retired as a director of JESSOP-SAVILLE, LIMITED, Sheffield, the steelmaking subsidiary of Birmingham Small Arms, Limited. After graduating from Glasgow University in 1917, he joined BSA at Birmingham as assistant chemist, transferring to Jessop-Saville six years later as chief chemist and metallurgist.

MR. D. W. HAMMOND

Mr. Hammond rose from assistant works manager to become works manager in 1935. He was appointed to the local board in 1942 and was elected a director of Jessop Saville in 1959. He made contributions to the firm's expansion and took a prominent part in the diversification of products, particularly in the fields of gas turbine high temperature steels, and the development of titanium production.

A Fellow of the Royal Institute of Chemistry, he is also a member of the Iron and Steel Institute and a Fellow of the Institution of Metallurgists. He has been a member of the management committee of the central council of the Iron and Steel Employers' Association.

FIRTH CLEVELAND, LIMITED—Mr. G. Harries has been appointed a director.

ROTARY HOES, LIMITED—Mr. A. Mc. L. Morrison has been appointed to the board.

SHEEPBRIDGE ENGINEERING, LIMITED—Mr. Willoughby R. Norman has been appointed a director.

BECK & COMPANY (METERS) LIMITED—Mr. R. Stephen Wild has been appointed a director.

NORTH BRITISH LOCOMOTIVE COMPANY, LIMITED—Mr. H. A. Siepmann has retired from the board.

PRINCE OF WALES DRY DOCK COMPANY SWANSEA, LIMITED—Mr. A. Foulds and Mr. J. E. Morgan have been appointed to the board.

THOS. STOREY (ENGINEERS), LIMITED—Mr. Thomas Storey has resigned as chairman and managing director, and left the company last week.

FRY'S (LONDON) LIMITED—Mr. C. L. Norfolk has been appointed technical director and also adviser to the board on new production methods.

BLAW KNOX, LIMITED—Rear-Adml. A. J. Tyndale-Biscoe has been appointed managing director of the construction machinery and steelworks departments.

ARNOTT & HARRISON, LIMITED—Mr. L. Bunn, Mr. T. W. Elkington, Mr. J. C. Jones, Mr. S. C. Clifton, and Dr. R. Genders have been appointed to the board.

C. A. PARSONS & COMPANY, LIMITED—Mr. E. C. Rippon has been appointed a director, and Mr. F. G. H. Bedford and Mr. F. W. Gardner have resigned from the board.

HILGER & WATTS, LIMITED—Mr. A. H. Campbell, a director since 1951 and general manager since 1954, has been appointed joint managing director with Mr. G. A. Whipple.

SOUTH DURHAM STEEL & IRON COMPANY, LIMITED—Mr. J. E. Shepherd has relinquished his position as assistant managing director, but will continue to be a member of the board.

WELLMAN SMITH OWEN ENGINEERING CORPORATION, LIMITED—Mr. C. D. Wattleworth has been appointed assistant managing director (technical), and Mr. D. A. Hume assistant managing director (commercial).

G. N. HADEN & SONS, LIMITED—Mr. F. A. Pullinger, managing director, has been appointed chairman and managing director with effect from July 31. He succeeds Mr. J. R. Paterson, who has retired.

ARDROSSAN DOCKYARDS, LIMITED—Mr. R. G. Kincaid has resigned from the positions of chairman and director. Mr. W. I. Duckworth, director and general manager of Burns & Laird Lines, Limited, has been appointed chairman.

BARROW HEPBURN & GALE, LIMITED—Mr. Ralph Lindsay has retired from the board, but will continue to sit on the boards of the subsidiaries Thomas Holmes & Sons, Limited, and Richard Hodgson & Sons, Limited, of which he is joint managing director.

RICHARD CRITTALL HOLDINGS, LIMITED—Following the reconstitution of the company as an industrial holding company, Sir George Cuffe has resigned from the board for health reasons and Mr. G. F. Wattears has resigned to devote his time to the main operating subsidiary Richard Crittall & Company, Limited. The board now comprises Mr. G. C. R. Eley, Sir Leonard Dyer, Mr. J. P. Hamill, Mr. W. R. Cox, and Mr. A. W. Powley.

W. CANNING & COMPANY, LIMITED—Mr. F. H. Ewens has relinquished his joint managing directorship, but will continue to be chairman of the board. Mr. W. H. Griffin, joint managing director, is appointed deputy chairman and will become sole managing director. Mr. L. G. Mummery, director and secretary, will relinquish the office of secretary and is appointed assistant managing director. Mr. J. M. Stevens will succeed him in the office of secretary. Mr. D. Paddon-Smith is appointed to the board in place of Mr. S. S. Dawson, who has retired.

Another Record Year for Metal Box

DESPITE lower profit margins for the second half of the financial year, the Metal Box Company, Limited, announces another sales record for the year ended March 31, 1961. Profit, before tax, shows an increase of 7.6 per cent. over previous figures. The directors recommend a final dividend of 7 per cent., as previously intimated, on increased ordinary capital to make a total payment of 12 (10.9 equivalent) per cent.

Group income expanded from £83,400,000 to £91,900,000 and profits, before tax, from £7,830,000 to £8,420,000.

During the year the ordinary capital was increased from £19,768,282 to £25,649,379 by the one-for-10 scrip issue made last July, the one-for-six rights issue to ordinary holders in January and the issue to directors and employees last March. Group net profit expanded to £4,843,000 (£4,459,000).

Dividend of the subsidiary, Metal Box Company Overseas, Limited, is maintained at 11 per cent. on £5,000,000 ordinary capital, against £3,500,000 previously. Group net profit of the subsidiary increased to £1,587,000 (£1,254,000).

Company News

BID FOR SUPERHEATER

Share Exchange Offer by International Combustion

OFFER has been made by International Combustion (Holdings), Limited, to acquire the £926,100 capital of the Superheater Comany, Limited, steam superheater makers, of London, W.1, on the basis of seven 5s. ordinary shares of International Combustion for every 10 Superheater ordinary or "A" ordinary 5s. share. The majority Superheater shareholder, Combustion Engineering Inc., of New York, which hold 736,500 ordinary and 927,750 "A" ordinary shares, intends to accept, as do the directors of Superheater, who strongly recommend the offer.

International Combustion has recently renewed its agreement with Combustion Engineering covering technical advice for a further minimum period of 10 years on terms providing for the payment of certain royalties and the allotment of 239,980 International Combustion ordinary shares. If the offer becomes unconditional, Combustion Engineering will hold just over 10 per cent. of the increased ordinary capital of International Combustion.

Mr. E. A. Robinson, chairman of Superheater, points out that the company is tending to become increasingly dependent for orders on International Combustion. The two boards have therefore come to the conclusion that it is essential to the continuing progress of both companies that they should co-operate in future under such conditions as can be achieved only by a complete merger of interests.

It is intended that Superheater shall retain its identity and continue to trade under its own name.

LANCASHIRE STEEL CORPORATION, LIMITED—Interim dividend of 3½ per cent. is recommended for the year ending September 30, 1961.

H. J. ENTHOVEN & SONS, LIMITED, lead smelters, refiners, metal merchants, etc., of London, E.C.2.—Dividend for 1960 is increased to 8 (6) per cent. Group profit improved to £87,554 (£71,807) after tax of £334 (£229 credit).

CHARLES CHURCHILL & COMPANY, LIMITED, machinery and tool merchants, of Birmingham—A final dividend of 11½ per cent. makes 20 (18) per cent. for the year ended March 31, 1961. Net profit is £435,936 (£275,000) after tax of £355,383 (£199,437).

STEIN ATKINSON VICKERS HYDRAULICS, LIMITED, manufacturers of oil hydraulic equipment, of London, S.W.7—The balance of the outstanding shares has been acquired by Sperry Rand, of the United States, which previously held a 50 per cent. interest.

CONSETT IRON COMPANY, LIMITED—With a final of 6½ per cent., dividend for the year to April 1, 1961, is raised to 9½ (8¼) per cent. on £10,000,000 ordinary capital. Profit balance, before tax of £633,750 (£303,168), is up to £2,473,203 (£1,997,158).

JOHN SUMMERS & SONS, LIMITED—Interim dividend of 6 per cent. is announced in respect of the year ending September 30, 1961, on 20,250,000 ordinary shares of £1 each, to be paid on July 15 to ordinary shareholders registered at the close of business on June 10.

RICHARD JOHNSON & NEPHEW, LIMITED, iron, steel, and non-ferrous wire drawers and rollers, etc., of Manchester—The directors state that despite the fall in profit to £851,698 (£1,087,688) the 11 per cent dividend and profit-sharing bonus will be maintained.

BRITISH OXYGEN COMPANY, LIMITED, manufacturers of industrial gas plant, and gases, of London, S.W.1—The company has acquired the capital of Dupree, Swift & Company, Limited, manufacturers of copper vacuum containers for liquid oxygen, helium, etc., of London, S.E.1.

WM. PARK & COMPANY, FORGEMASTERS, LIMITED, WIGAN (Lancs)—Proposals for simultaneous one-for-two scrip and rights issues are announced by the company, which is also to seek a London quotation—the shares are quoted in Birmingham and Manchester at present. It is also proposed to create 12,000,000 new 2s. ordinary shares.

MORGAN CRUCIBLE COMPANY, LIMITED, manufacturers of furnaces, refractories, etc., of London, S.W.11—Following increased profits, the company is raising its dividend for the year ended April 2, 1961, to 14 (13) per cent. with a 9 per cent. final. Group profits for the year were £2,235,815 (£2,043,417), subject to tax of £1,087,759 (£936,159).

JOHN THOMPSON, LIMITED, manufacturers of boilers and ancillary equipment, etc., of Wolverhampton (Staffs)—The group reports a net loss of £1,776,511 for 1960 against a net profit of £324,311 for 1959, after provision of £2,203,000 for exceptional losses on contracts. There is no final dividend and the total for the year is 5 (20) per cent.

ARNOTT & HARRISON, LIMITED, tooling equipment manufacturers, of London, N.W.10—A scrip issue of one-for-two, plus a rights issue of redeemable convertible preference shares are to be made. The board is maintaining the dividend at 22½ per cent. for 1960. Group net profit went up from £138,704 to £160,482, after tax of £162,593 (£151,378).

G. & J. WEIR, LIMITED, engineers and founders, etc., of Glasgow—Taking all factors into account, says Viscount Weir, the chairman, "our position is still a difficult one, and I do not expect 1961 to be a good year for the group's trading." He expects, nevertheless, that the company will be able to maintain the current rate of distribution.

NEWALL ENGINEERING COMPANY, LIMITED, machine tool and measuring instrument manufacturers, of Peterborough (Northants)—Against the forecast of 17½ per cent. a dividend of 20 per cent. for the year to March 31, 1961, is being paid on capital increased by a one-for-four rights issue. Group net profit increased to £107,349 (£74,917) after tax of £100,000 (£80,000).

BATH & PORTLAND STONE FIRMS, LIMITED, limestone quarry owners, of Bath (Som)—It is proposed to

acquire K.D.G. Instruments, Limited, and Stow & Partners, two associated businesses making a wide range of industrial instruments and special-purpose machine tools. The independently fixed purchase price is £510,000, consisting of £23,500 in cash and the balance by the allotment of 556,000 ordinary shares of 5s. each.

JOHNSON & PHILLIPS, LIMITED, manufacturing engineers and cable makers, of London, S.E.7—The company is resuming ordinary dividends with a 5 per cent. recommendation for 1960. While there was no dividend for 1959, holders received a 3 per cent. capital distribution. At about £10,000,000 (£9,000,000), group sales in 1960 established a record. Trading profits were £24,171 (£91,084 loss) before tax of £71,000 (£53,000).

DAVIS & TIMMINS, LIMITED, screw manufacturers, of London, E.17—The directors intend to recommend acceptance of the share exchange offer proposed by Delta Metal Company, Limited, brass, bronze and copper manufacturers, of London, S.E.10. Chairman of Davis & Timmins, Mr. F. Le Neve Foster, announcing this, said the board considers the terms, two Delta 5s. ordinary for each Davis 5s. ordinary ex dividend, are fair and reasonable.

W. H. ALLEN SONS & COMPANY, LIMITED, mechanical, hydraulic and electrical engineers, of Bedford—Group profit, before tax, for 1960 amounted to £794,186 against the 1959 figure for the parent only of £903,630. The parent's 1960 profit is £667,210. After tax of £377,000 the group net profit is £417,186, the parent company's being £370,210 (£491,630). A final dividend of 7½ per cent. makes 10 per cent. against the 1959 total equivalent of 9⅓ per cent.

WOLVERHAMPTON DIE CASTING COMPANY, LIMITED—Declaring an unchanged interim dividend of 10 per cent. the chairman, Mr. W. C. Sproson, says that, while a revival in demand for the company's products from the car industry is apparent, this has come too late to have any marked effect on the profits for the year to June 30, 1961.

N. GREENING & SONS, LIMITED, wire cloth manufacturers and metal perforators, of Warrington (Lancs)—With the sales outlook no less favourable than in 1960, the chairman, Mr. C. G. Fraser, looks forward to "another satisfactory year." Group sales and profits were a record for the year to March 31, 1961. An increase in home sales was matched by a rise in export sales and the group net profit expanded to £320,070 (£277,063). Dividend is raised 11 (9¼ equivalent).

British Oxygen Sales Higher

SALES of the British Oxygen Company, Limited, for the half-year to March 31, 1961, totalled £30,650,000, compared with £29,500,000 for the comparable period last year, and with £59,800,000 for the full year to last September. The half-year's group trading profit amounted to £4,651,000 (£4,951,000), and after tax of £2,015,000 (£2,400,000), there is a net balance of £2,636,000 (£2,551,000).

An interim dividend of 4 per cent. is to be paid in respect of the year to September 30, 1961, on capital increased by last November's one-for-five rights issue and the recent one-for-two scrip issue. Taking the scrip issue only into consideration, it is the same equivalent interim as previous. The equivalent total for 1959-60 was 10⅔ per cent.

Trading conditions, says Mr. J. S. Hutchison, continue as described to members at last February's meeting.

The Scrap Markets

Stocks Determine Steelmakers' Demand

GENERALLY, steelmakers are maintaining high outputs and are open to accept all heavy steel and basic scrap which is offered to them. Cases where traffic in scrap has been stopped due to overstocking or congestion in steelworks' sidings are reported but they do not represent the run of trade.

Business with the cast-iron foundries is on a fairly brisk basis and buyers are constantly on the lookout for suitable parcels of cast-iron scrap.

Cleveland—There is an abundance of steelmaking scrap available in the North-east Coast area, but steelworks are still limiting their intake according to the size of their stocks. As a result, their orders to merchants tend to be varied and intermittent and there is a surplus of material, some of which is being transferred to other consumers principally in Scotland. Foundries have also reduced slightly their acceptances of cast-iron scrap which has been a strong feature of the trade for the past few months, but blast-furnace requirements for baled scrap and steel turnings remain strong and regular.

Scotland—Business throughout Glasgow and the west of Scotland continues to follow the usual pattern; the tonnage of scrap material changing hands remains at a fairly satisfactory level and outlets for practically all grades are readily obtainable. The steelworks provide an ever-open door for all available supplies of heavy steel and basic scrap and no difficulty is experienced in disposing of these grades. The production of steel turnings is well up to average and traffic is flowing freely to the usual consuming works.

The output of cast-iron borings is well maintained and regular consignments are going forward to the blast furnaces. The improvement in the foundry trade has been maintained and the various works buyers are now on the lookout for suitable parcels of cast-iron to meet their current melting requirements.

Lancashire—Trade in iron and steel scrap materials is described by merchants as proceeding on a fairly even keel, though in one or two sections available supplies are not being taken up quite so readily as they were a short time ago.

Reasonably good tonnages of cast scrap are reported to be coming on to the market and a quietly steady demand from foundries in the area is being met. Steel melting sorts are moving off fairly freely.

South Wales—Merchants are holding sufficient stocks of scrap in their yards to meet any reasonable demands, but steelmakers and ironfounders are holding so much stock on the ground that the movement of scrap is extremely limited.

The market is quiet, and until there is an increased demand for finished products, there is little likelihood of the position improving.

Recent Wills

KENNEDY, JAMES, managing director of the Scottish Wire Rope Company, Limited	£37,328
ADNITT, H. T., formerly chief accountant of the English Electric Company, Limited	£6,564
ALLEN, H. V., a director of Allen & Son (Halifax), Limited, makers of insulating and fire bricks	£24,026
DAWSON, W. J., metallurgical director of Hadfields, Limited, Sheffield, from 1919 to 1947, and an authority on the development of steel castings and alloy and heat-resisting steels	£70,750

Merger Proposals for Aluminium Companies

PROPOSALS for the acquisition by the British Aluminium Company, Limited, of Reynolds T.I. Aluminium, Limited, have been announced. Following the acquisition of control of British Aluminium two years ago by Tube Investments, Limited, in association with Reynolds Company of America, the aluminium plants of BA and RTIA, through which company the control is exercized, have been operated as a single group.

To complete the merger it has now been agreed, subject to approval by holders of BA, that BA shall purchase for £10,000,000 all the undertaking of RTIA other than its holding of stock in BA and its shares in its wholly-owned subsidiary, Venesta Foils, Limited, with effect from July 31, 1960. Venesta has its own separate board and has not been merged with that of BA.

£500,000 Steel Mill Order

NEW 14-in. merchant bar and section mill costing over £500,000 is to be installed at the Osier Bed Works of Wolverhampton & Birchley Rolling Mills, Limited, a member of the Thos. W. Ward, Limited, group of companies. Orders for the new plant have been placed with Brightside Foundry & Engineering Company, Limited, Sheffield, and the rolling mill and its equipment will cost over £300,000.

Buildings for the new mill will be erected by the structural steelwork department of Thos. W. Ward, and five overhead electric cranes will be supplied and installed by John Smith (Keighley), Limited, another member of the Thos. Ward group. When the scheme is completed in about two and a half years' time, the productive capacity of the company will increase to about 150,000 tons of steel bars and sections a year.

NEW RESEARCH CENTRE OPENED BY SANDVIKS STEELWORKS

NEW steel research centre and laboratories of Sandvikens Jernverks, AB (Sandvik Steel Works), Sweden, were formally inaugurated by the King of Sweden last week. This major extension of the research facilities at the company's works, 120 miles north of Stockholm, cost about £500,000.

Group sales of the company expanded by 21 per cent. in 1960 to £31,300,000. The value of exports also increased 29 per cent. to £16,500,000. There was a profit by the parent company before tax of £4,360,000, and after £3,300,000 to reserve the net profit was £640,000.

THREE SETS OF lifting apparatus for moving helpless patients from hospital beds have been produced by 22 apprentices from iron and steel companies. Working together, the apprentices made the apparatus at the Granville College of Further Education, Sheffield, and it was given as a practical gesture during Commonwealth Training Week to representatives of the Nigerian and Indian High Commissioners and Sheffield United Hospitals. The companies concerned allowed the apprentices time to produce the 300 metal, plastics, and nylon components.

Hadfields Appoints Five New Directors

APPOINTMENT of Sir Peter Roberts, MP, to the board of Hadfields, Limited, steel manufacturers, of Sheffield follows the acceptance of an offer by an industrial and financial group to subscribe to 2,616,184 £1 ordinary shares in Hadfields at par.

SIR PETER ROBERTS

Sir Peter is leader of the subscribing group as well as chairman of the Wellman Smith Owen Engineering Corporation, Limited, and Newton Chambers & Company, Limited. He is a director of the Staveley Coal & Iron Company, Limited, and other concerns. It has already been announced that Sir Peter is to become vice-chairman of Hadfields.

Other appointments to the board of Hadfields are: Mr. Frederick H. Brooks, managing director of the Wellman Smith Owen Engineering Corporation, Limited, Lord Riverdale, chairman and managing director of Arthur Balfour & Company, Limited, managing director of C. Meadows & Company, Limited, and a director of Newton, Chambers & Company, Limited, and other companies; Sir Robert Adeane, chairman of Ransomes & Rapier, Limited; and Mr. Kenneth E. Walker, also a director of Newton, Chambers and other concerns.

Peat Not Suitable as Fuel for Smelting

AS an alternative fuel to coal or coke for steelmaking, peat is not highly rated either by the steel industry or by peat producers. This is the reaction to a letter to the Yorkshire Post by Mr. John Connell, a quotation from which was given in last week's IRON AND COAL. Mr. Connell claimed it was possible to produce high grade smelting fuel from peat, of which there was 5,000,000 tons available "on the doorstep of almost every steelworks."

A spokesman for the British Peat Moss Litter Company, Limited, which cuts peat on Thorne Moors, near Doncaster, said last week: "This company tried nearly 25 years ago to get active carbon from the peat here, but could not get anywhere near the grade of carbon required for smelting purposes." Out of every thousand pellets used in experiments, only about 10 yielded the carbon content required.

At the Scunthorpe steelworks of Richard Thomas & Baldwins, Limited,a spokesman said: "We cannot foresee anything in the way of solid fuel substituting for coke with the same efficiency."

PLANNED IN HONOUR of Mr. Frank Perkins, founder of the Peterborough diesel engineering firm of F. Perkins, Limited, the Frank Perkins Room in the new engineering wing of Peterborough Technical College was opened last Friday. Equipment costing over £4,000 has been given by the company.

Law Cases

CLAIM AGAINST SCOW

AT Newport (Mon) County Court, Judge O. Temple-Morris postponed his decision on a case in which the Steel Company of Wales, Limited, is contesting a claim for £200 damages for breach of statutory duty and/or negligence, made by Mrs. J. McLoughlin on behalf of her late husband. The case was adjourned until next Thursday.

It was stated that in 1958, when employed in the mill department of the Orb works, Newport, Mr. McLoughlin tripped over the cable of a cooling fan while inspecting a roller-mill. The company contended that the fans were regarded as the men's own property, and the duty was on them to see that the fans did not interfere with their work.

£900 DAMAGES FOR MINER

DAMAGES of £900 were awarded in the Court of Session against the National Coal Board to Mr. Aitken Wotherspoon (66), a miner, for injuries received while pushing a truck at Alice Colliery, near Cowdenbeath (Fife), in 1957. Mr. Wotherspoon said that while shunting trucks one of them failed to enter a siding, and to remove it he had to push it from behind over a projection on the rails. In doing so he severely strained his back.

The Coal Board, which denied liability, said Wotherspoon was given the job of tailman because he had asked for light work. It claimed that he had suffered from spinal trouble for a number of years before the accident.

SHOT-FIRER BROKE RULES

FOR failing to post sentries or warning fences at each entrance to a danger zone before detonating shots at Loanhead Colliery, East Wemyss (Fife), thus causing injury to Mr. Robert Logan, colliery deputy, James Carroll was fined £12 at Kirkcaldy Sheriff Court.

The injured deputy said that he passed two men on his way to the face. They mentioned nothing to him about shotfiring, and it was not until he was about to cross the conveyor that he noticed a shotfiring cable connected to the shots. He realized that shotfiring was about to take place, but before he could do anything the explosion occurred.

WORKMAN'S £12,000 DAMAGES

DAMAGES of £12,690 were awarded at Worcestershire Assizes against British Insulated Callender's Construction Company, Limited, civil engineering contractors, of London, W.C.2, in favour of a workman, Mr. B. McDonagh, who was stated to have received a brain injury when struck by a falling pair of pliers while working at the base of a pylon. The company admitted liability, but could not agree on damages.

Mr. J. Griffiths, for Mr. McDonagh, said that as a result of the accident, which took place at Cirencester, he would not be able to work again, while the company submitted that he would be able to undertake light tasks.

TWO MINERS at Oakdale Colliery (Mon), Michael John Moore and Anthony George Page, were fined £2 each at Blackwood Magistrates' Court for taking cigarettes underground.

MINER AT Rothes Colliery, Thornton (Fife), Harold Dinsdale, admitted at Kirkcaldy Sheriff Court that he failed to return a canister of explosive to the pit's explosive store at the end of a shift. He was fined £15.

Half-year Rise in Profits of Colvilles

NET manufacturing and trading profit of Colvilles, Limited, for the six months to March 31, 1961, after all charges including taxation of £2,015,000 (£2,648,000), increased from £4,082,000 to £4,916,000, and the company has declared an interim ordinary dividend of 6 per cent. (same) for the year. Sir Andrew McCance, chairman, reports however that the pressure of demand has slackened, and that the group's high rate of production has had to be somewhat curtailed. The underlying market conditions, however, have remained steady, so that the prospects of maintaining a reasonable level of operations are still good.

The group's output figures, which are all up compared with the same period a year ago, were: Pig-iron, 554,451 (442,276) tons; steel ingots and castings, 1,155,369 (1,036,374) tons; and coke, 425,074 (302,671) tons. Progress is being maintained on the construction of the strip mill and other development schemes, and expenditure incurred on these schemes to March 31 amounted to over £32,000,000. A first call of £15,000,000 was made during March on the loan arranged with the Government.

Woodall-Duckham Outlook for 1961 is Promising

WHILE not expecting the net profits for 1961 to reach the level of 1960, Mr. T. C. Finlayson, chairman of Woodall-Duckham Construction Company, Limited, contractors for gas works, carbonizing plants, coke ovens, by-products recovery plants, etc., of London, S.W.3, says that the overall future position is promising. The directors expect that profits for the current year will enable dividends of 21 per cent. on capital to be increased by the recently announced one-for-three scrip issue, to be paid with "an adequate margin for reserves." Stressing the importance of diversification of the group's activities by the acquisition of various operating subsidiaries, Mr. Finlayson points out that, although the principal operating company provided the majority of the group's orders, the six other operating subsidiaries contributed 34 per cent. of the group order-book in 1960.

Rise in Exports of British Electrical Equipment

OVERSEA sales of electrical and allied engineering products last year amounted to more than one tenth of the UK's total exports of manufactured goods, reaching a total of £293,400,000, according to a survey published by the British Electrical and Allied Manufacturers' Association. Exports went to nearly every country in the world.

Since 1950 the annual output has risen by 83 per cent. from £160,000,000 to £293,000,000, though in recent years the annual percentage increase has fallen. About a third of the industry's exports is made up by electrical power plant, machinery and industrial equipment, while other major categories are electronic and telecommunications apparatus, domestic appliances and cables.

NEWS IN BRIEF

AGREEMENT to produce, under licence, a German-designed luffing jib crane has been made by the Pearson Machine Tool Company, Limited, Newcastle-on-Tyne.

TO MEET an ever-increasing demand for highly-trained commercial executives in its organization, Leyland Motors, Limited, is to introduce a commercial apprenticeship scheme.

CLOSURE OF THE coke ovens at the Cargo Fleet (Middlesbrough) works of the South Durham Steel & Iron Company, Limited, on July 2, will result in about 60 men becoming redundant.

THE ENGINEERING WORKS of W. H. A. Robertson & Company, Limited, Bedford, are to be increased by over a half and the number of workers will be increased from 1,250 to about 1,700.

REDEVELOPMENT SCHEME to cost about £400,000 is to be carried out by the Metal Box Company, Limited, at Carlisle. The work will be spread over three years and the first phase will cost £250,000.

NEW CANTEEN, part of its concentration and modernization plan at Hereford, costing about £30,000 has been opened for employees of Henry Wiggin & Company, Limited, nickel and nickel alloy manufacturers, of Birmingham.

UNDER AN AGREEMENT between the two companies, Dale Electric (Yorkshire), Limited, electrical engineers, of Filey, and Cummins Engine Company, Limited, diesel engine manufacturers, of Shotts (Lanark), will combine in generator set production.

SAND SPUN PLANT at the Chesterfield works of the Staveley Iron & Chemical Company, Limited, is to be closed at the end of July due to the fall in demand for sand spun pipes. Work for 200 displaced men is expected to be found elsewhere in the works.

FURTHER STEP in the expansion plans of the Charles Churchill & Company, Limited, group is marked by the purchase of Henry Milnes, Limited, manufacturers of boring machines, lathes, and other machine tools, of Bradford. The existing management of Henry Milnes will continue in office.

FOLLOWING THE threatened strike last week at the Shotton (Ches) works of John Summers & Sons, Limited, the Iron and Steel Trades Employers' Association has written to the Minister of Labour to ask for an investigation into the industry's negotiating procedure. The request is under consideration.

AGREEMENT has been signed by MacDonald & Company (Haydock), Limited, structural and mechanical engineers, of Haydock (Lancs), with the American designer, Mr. E. Jefferson Crum and his associates, Wirecrafters Incorporated, for the manufacture of orbital wire packaging and transporting devices.

IRON ORE IMPORT figures for the Hartlepools—318,355 (251,282) tons—for the first 20 weeks of the year reflect a bigger demand from the steelmakers, compared with the same period in 1960, but coal exports from the ports to the Continent and the south of England amounted to only 1,338 (12,153) tons.

NEW £100,000 hydraulics laboratory, claimed to be the largest and most up-to-date of its kind in Europe, went into commission at Kilmarnock on Thursday. It will serve the Glenfield group of companies and will be operated by the parent company, Glenfield & Kennedy, Limited, hydraulic engineers, of Kilmarnock.

THE CURRENT ISSUE of the China Trade and Economic Newsletter reveals that the value of imports from China to the UK has risen from £12,300,000 in 1955 to £24,900,000 last year and for the first quarter of 1961 has already reached £7,700,000. Britain has increased her exports to China from £7,900,000 in 1955 to £32,100,000 last year. The figure for the first quarter of 1961 is £4,500,000.

EXPERTS of the European Coal and Steel Community have completed their report on an application of Thyssenhütte, the Ruhr steel concern, to acquire control of Handelsunion, Germany's largest steel trading company, and to increase to just below 50 per cent. its holding in Rasselstein, makers of tinplate and steel sheet.

THE British-Swedish Chamber of Commerce in Sweden announces that one of Sweden's foremost manufacturers of products made from wire rods wishes to develop its export to Britain by appointing an agent. Firms wishing to be considered for the appointment should apply in confidence to the Chamber at Hovslagargatan 5B, Stockholm C, before July 15.

ENTIRE CAPITAL of Alucaps Italiana S.p.a., of Milan, has been acquired by the Metal Closures, Limited, group, of West Bromwich (Staffs). For many years Alucaps Italiana S.p.a., has been licensee for Metal Closures in Italy. A spokesman for the West Bromwich firm said that the move was "the first step in getting the company launched into the Common Market."

CHAIRMAN OF Bowmaker (Plant) Limited, machinery dealers of Willenhall (Staffs), Mr. C. J. Lake, opened the company's new south-western depot in Exeter on Tuesday. The new depot replaces Bowmaker's Fenny Bridges branches, and is designed to deal with all types of Caterpillar earth-moving equipment, the sale of new and reconditioned plant, servicing, and spares.

TWO CAST-IRON flasks, which left the Stevenston (Ayrshire) works of the Ardeer Foundry Company, Limited, this week, are the first of their kind to be made for transporting radio-active fuel elements to power stations. Built for the UK Atomic Energy Authority, each flask weighs 42 tons and has sides 16 in. thick. The order was placed for the Bradwell and Berkeley power stations.

FOR THE atmospheric distillation unit and gasoline treating unit to be built at the Strasbourg refinery of the Société de la Raffinerie de Strasbourg, process design, basic mechanical design, and general supervision services to the contractors, PIC Engineering, Limited, are to be provided by McKee Head Wrightson, Limited, a company jointly owned by Head Wrightson & Company, Limited, and Arthur G. McKee, of the USA.

STATING THAT last year more than 1,500 tons of soot fell on the three square miles of the district, Mr. W. G. Danks, public health inspector, Hoyland (Yorks) Urban District Council, said it appears that until some acceptable agreement can be devised whereby miners may be supplied with smokeless fuel, gas, or electricity, comparable with the cash value of their concessionary coal, smokeless zones cannot be effectively secured in mining areas.

AS A RESULT of a sales agreement with the American Meter Company, Incorporated, Philadelphia, the gas meters division of Parkinson & Cowan, Limited, is now marketing in the UK the American company's volume and pressure gauges and base pressure and volume indexes. All the equipment covered by the agreement is for use with the new type of high-pressure meter recently introduced to this country by Parkinson Cowan and also with the Connersville-type meters distributed by W. C. Holmes & Company, Limited.

Coal fashions the

EVE HAS NEVER BEEN CONTENT with mere concealment: she has always known the subtle values of transparent adornment and became an eager customer for the famous Brettles silk stockings of the nineteenth century, which gave her aristocratic ankles a new intriguing glamour. Today the sheerest whisper of Brettles nylon—combining perfect styling, delicate shades and tensile strength—gives her legs the 'look longer' appeal, to the delight of every Adam she meets . . . and captivates.

The astute men who shaped this industry have a flair for making long term decisions that are both wise and profitable. That is why they choose coal. Coal gives them all the power and heat they need at the lowest possible cost. And they know that coal—the home produced fuel—is free from the fluctuations of foreign policies. British coalfields can provide an uninterrupted source of solid fuel for hundreds of years to come.

Remember Brettles when you are asked to make a decision on fuel. They choose coal. Follow their example—it's a model of perfection.

stocking... for Brettles

How Coal shapes the future for Brettles' plant at Belper.

Mr. W. Bennett, Chief Fuel Engineer, comments: "We at Brettle's use coal for all our steam processes.

Our boilerhouse consists of two shell type boilers, each working at a pressure of 90 p.s.i. and these give us a first-rate service at a high efficiency. Each boiler is opened up for cleaning and inspection once a year and hardly any other maintenance is required.

There is an Economiser, fitted with scraper gearing and the usual mountings such as feed water regulators, on each of the boilers.

Firing is by sprinkler-type stokers and all fuel is handled mechanically. It is delivered direct into a concrete hopper and gravitates through a grid to a vertical chain conveyor. The fuel is then fed to the boiler hoppers by a horizontal screw and from there it flows on to the mechanical stokers which were installed five years ago.

These improvements have resulted in an increased evaporation of steam whilst the fuel consumption has been reduced by over 20 per cent. By making improvements whenever possible, our equipment has grown alongside production demands.

The quality of the coal is consistent and we are convinced that we shall continue to use coal for years to come."

Here are some key facts and figures about the power house at Chapel Street, Belper.

Boilers:	2 shell type
Method of firing:	Automatic sprinkler stokers
Steam pressure:	90 p.s.i.
Steam temperature:	330° F.
Max. continuous rating:	18,000 lbs. of steam per hour
Annual fuel consumption:	2,250 tons of coal

SOLID FUEL—more heat at less cost—and it's British

PROGRESSIVE INDUSTRY IS GOING FORWARD ON

COAL

ISSUED BY THE NATIONAL COAL BOARD

"Excessive Capacity" of UK Rolling Stock Industry

PRODUCTIVE capacity of the rolling stock industry in the UK is "grossly excessive" in relation to the value of orders available, and this is the basic problem facing the company, says Mr. F. D. O'Brien Newman, chairman of the Birmingham Railway Carriage & Wagon Company, Limited, in his annual statement. This position was made more difficult by the fact that the company's main customer, the British Transport Commission, is itself an important manufacturer of wagons, carriages, and locomotives.

Oversea almost all contracts on offer were open to international tender where foreign competitors were mostly able to offer extended export credit terms which UK contractors had been unable until now to approach, and it remained to be seen whether the facilities now proposed by the Board of Trade would be sufficient and timely enough to be of real benefit. The board's tasks were to stop the further losses which were inevitable on the present basis, and to devise ways of utilizing the excellent production facilities which the company had in the heavy engineering field, if necessary by diversification or through the acquisition of other profitable activities.

Referring, at the annual meeting, to the £3,250,000 contract from London Transport Executive which the company had to return because it would have involved too great a loss to carry out at the price, the chairman said that both London Transport Executive and the British Transport Commission had been understanding throughout, and he believed the goodwill of the company had not been damaged and that it would have opportunities of tendering in future.

NEW ROLLS-ROYCE APPRENTICE TRAINING CENTRE OPENED

NEW apprentice training centre at the oil engine division of Rolls-Royce, Limited, Shrewsbury, was opened last Friday by Lord Hives, former chairman of the company. The centre will provide comprehensive engineering training for over 100 of the 250 apprentices being trained in the factory, and includes a basic engineering school which will provide training for all first-year apprentices.

The centre also includes an advanced training school in which apprentices who have completed a year of elementary training in the basic school and a year's experience in the factory will receive specialized training in a particular branch of their trade before returning to the factory to complete their apprenticeship.

West German Steel Output Rises

PROVISIONAL figures issued by the Federal Bureau of Statistics show that West Germany's crude steel production in May totalled 2,802,119 tons, compared with 2,767,766 tons in April. It is the first time this year that the monthly steel production figures failed to equal those of the corresponding month last year.

Production in the first five months of this year, at 14,410,649 tons, was nearly 3 per cent. up on the 14,053,707 tons production in the corresponding period of 1960.

Obituary

MR. JOHN C. LANG

CHAIRMAN of the Scottish Board for Industry, Mr. John C. Lang died on Saturday at the age of 65. A former steelworker, he was Scottish secretary of the Iron and Steel Trades Confederation from 1946 until his retirement last March. He was a former treasurer and chairman of the Scottish Trades Union Congress, and took a leading part in its campaign to secure a steel strip mill for Scotland.

Mr. Lang was a member of the Scottish Council (Development and Industry), and had served on the Scottish Board for Industry since 1948, being appointed chairman 10 years later when he was the senior trade union representative. He was made OBE in 1951.

The death has occurred at the age of 69 of Major JOHN KINSMAN BRODIE, a director of Asbury, Brodie & Company, Limited, non-ferrous metals and chemicals merchants, of Birmingham.

Mr. WILLIAM HENRY GRIFFITHS, a former member of the national executive of the British Iron, Steel and Kindred Trades Association, and former No. 2 branch secretary at Rotherham, has died at the age of 83.

Mr. CHARLES SMITH, who until his retirement last year was a director of John Smith (Keighley), Limited, crane manufacturers, of Keighley (Yorks), has died at the age of 63. The company is now a subsidiary of Thos. W. Ward, Limited, Sheffield.

The death has taken place of Mrs. OLIVE M. A. GOTTO, chairman of A. L. Curtis (Onx), Limited, makers of refractories, etc., of Chatteris (Cambs), and widow of the founder of the firm. Mrs. Gotto had taken no active part in the business for the past few years.

The death has occurred at the age of 84, of Mr. RICHARD MADEN, who before his retirement, was manager for 12 years and undermanager for 18 years at the Scaitcliffe and Broad Oak Collieries, Accrington, of George Hargreaves & Company, Limited. Mr. Maden began as a half-timer and later became a getter, dataller and fireman.

Armstrong Whitworth Record Output Forecast

TURNOVER for 1961 in the principal department of Armstrong Whitworth (Metal Industries) Limited, Gateshead, is likely to be a record, forecasts Sir Adrian Jarvis, the chairman. A large-scale reorganization and development programme, including extensions to the roll foundry and a machine shop, has taken place in the manufacturing facilities for Armstrong Whitworth rolls. This is likely to increase production in the coming year as much as 20 per cent., "providing there is no set-back in the steel and non-ferrous industries," he states.

Profits were down compared with last year, but it is stated that the figures only reflect a comparison with a record year in 1959, which was accentuated still further by the inclusion of two major contracts finished some months ahead of schedule. Sir Adrian expresses confidence that, unless there are serious national set-backs, 1961 profits will be satisfactory.

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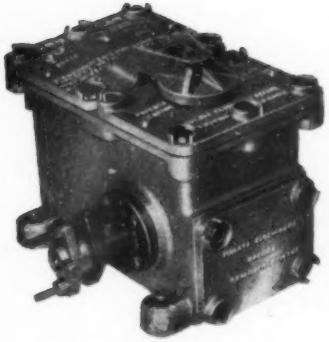

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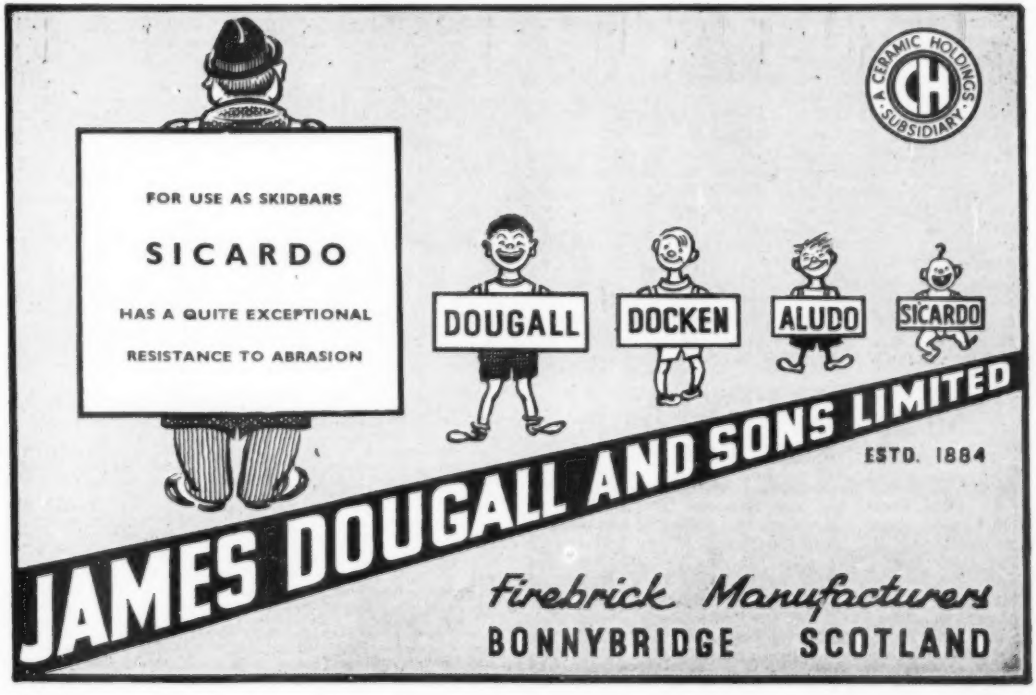


Higher Coal Exports from South Wales

TRAFFIC passing through the South Wales ports during the four weeks ended May 21, amounted to 1,208,842 tons, a decrease of 13,000 tons on the corresponding period for 1960. One of the biggest falls in imports was that of iron ore—67,000 tons. Iron and steel goods were 9,000 tons less, other ores, however, showed an improvement of 27,000 tons.

There was a welcome increase in the exports of coal, coke, and patent fuel, which rose by 86,000 tons, and iron and steel manufactures were up by 12,000 tons. Some 6,000 tons less of tinplate went through the ports.

In the first five months of the year there was less inwards traffic and greater exports, compared with a year ago. Imports of iron ore showed a substantial drop—1,629,903 (1,006,209) tons—but on the export side coal and coke shipments rose by 60,256 tons to 1,066,465 tons.

Tonnages through the seven ports, with 1960 figures in parentheses, were as follow:—Newport, 944,830 (884,416) tons; Cardiff, 901,174 (863,728) tons; Barry, 534,664 (497,562) tons; Port Talbot, 1,236,635 (1,296,198) tons; Swansea, 2,359,338 (3,094,240) tons; Penarth, 127,152 (148,577) tons; Lydney, 11,909 (12,766) tons.

Apprentice Award for NCB Trainee

MANAGEMENT trainee with the North-Eastern Divisional Coal Board, Mr. N. E. Riley (23), of Sheffield, is one of this year's three winners of the British Junior Chamber of Commerce Apprentice Awards Scheme. The award, for the best technical apprentice, was presented to him by the Duke of Edinburgh at a Commonwealth Training Week Exhibition in Birmingham last week.

Mr. Riley, who will spend nine months in Australia as a result of the award, started in the mines at the age of 15, later becoming a craft apprentice, then a student apprentice, and finally a management trainee. The son of a miner, he is the first NCB apprentice to win the award. He holds the Higher National Certificate in electrical engineering.

Speaking at the presentation of the awards, the Duke said employers, trade unions, and technical institutions should ensure that technical training schemes "really mean something." They should ask themselves: "Are the schemes for technical training in my industry or trade adequate to ensure their continued prosperity in the future."

MINERS END "NO STRIKE" AGREEMENT WITH NCB

AGREEMENT in principle between the National Coal Board and the National Union of Mineworkers has been reached on the ending of compulsory arbitration in the mining industry. Once this change has been formally ratified, the union will have the option, if it fails to agree with the Coal Board, of taking the matter to arbitration, or resorting to "other forms of action."

At present the union is bound by its conciliation agreement to accept arbitration if all else fails. The results of the arbitration are binding on both sides.

Increases of Capital

RENOWN STAINLESS STEELS, LIMITED, London, E.C.1, increased by £2,900 in £1 ordinary shares, beyond the registered capital of £100.

CORDES STEEL MILLS, LIMITED, Newport (Mon), increased by £11,900 in £1 ordinary shares, beyond the registered capital of £100.

PETERBOROUGH DIE CASTING COMPANY, LIMITED, increased by £17,000 in £1 ordinary shares, beyond the registered capital of £3,000.

TELCON METALS, LIMITED, Crawley (Sussex), increased by £950,000 in £1 ordinary shares, beyond the registered capital of £50,000.

HIGH SPEED STEEL ALLOYS, LIMITED, Widnes (Lancs), increased by £400,000 in £1 ordinary shares, beyond the registered capital of £600,000.

GLYNWED TUBES, LIMITED, Bilston (Staffs), increased by £1,000,000 in 5s. ordinary shares, beyond the registered capital of £2,000,000.

DAVIS & TIMMINS, LIMITED, engineers, etc., of London, E.17, increased by £250,000 in 5s. ordinary shares, beyond the registered capital of £600,000.

DAVY-ASHMORE, LIMITED (formerly Davy-United, Limited), Sheffield, increased by £2,500,000 in £1 shares, beyond the registered capital of £4,000,000.

THOS. W. WARD, LIMITED, coal, coke, iron, and steel merchants, etc., of Sheffield, increased by £2,000,000 in £1 ordinary shares, beyond the registered capital of £4,000,000.

GEORGE HEALEY & SONS, LIMITED, wire drawers and manufacturers, etc., of Brighouse (Yorks), increased by £5,000 in £1 shares, beyond the registered capital of £5,000.

BOULTON & PAUL, LIMITED, Norwich, increased by £1,500,000 in 500,000 unclassified shares of £1 and 4,000,000 unclassified shares of 5s. beyond the registered capital of £2,000,000.

TODD BROS. (ST. HELENS & WIDNES), LIMITED, iron and steel product manufacturers, etc., increased by £170,000 in 5s. ordinary shares, beyond the registered capital of £75,000.

HOFFMAN MANUFACTURING COMPANY, LIMITED, iron and steel converters, etc., of Chelmsford, increased by £1,000,000 in 5s. ordinary shares, beyond the registered capital of £1,500,000.

CRAVEN BROS. (MANCHESTER), LIMITED, engineers, etc., of Reddish, nr. Stockport (Ches), increased by £1,000,000 in 5s. ordinary shares, beyond the registered capital of £1,000,000.

CHAS. GRAY & COMPANY (STAMFORD), LIMITED, iron and steel merchants, etc., of Stamford (Lincs), increased by £20,000 in £1 ordinary shares, beyond the registered capital of £60,000.

AMBROSE SHARDLOW & COMPANY, LIMITED, ironfounders, engineers, etc., of Sheffield, increased by £1,000,000 in £1 unclassified shares, beyond the registered capital of £1,800,000.

HORSEHAY COMPANY, LIMITED, iron and steel roof and girder makers, etc., of Horsehay (Salop), increased by £140,000 in £1 ordinary shares, beyond the registered capital of £160,000.

MILES DRUCE & COMPANY, LIMITED, machinery and metal merchants, etc., of London, W.5, increased by £240,000 in £1 preferred shares, beyond the registered capital of £1,000,000.

A. A. JONES & SHIPMAN, LIMITED, machinery dealers, engineers, etc., of Braunstone (Leics), increased by £350,000 in 5s. ordinary shares, beyond the registered capital of £350,000.

LATCH & BATCHELOR, LIMITED, manufacturers and dealers in wire rope, etc., of Birmingham, increased by £20,000 in £1 "B" ordinary shares, beyond the registered capital of £60,000.

SPENCER WIRE COMPANY (STEEL), LIMITED (formerly Ranco Wires, Limited), Leeds, increased by £235,000 in £1 2nd non-cumulative preference shares, beyond the registered capital of £15,000.

V.M.E. CONVEYOR & FURNACE COMPANY, LIMITED, constructional engineers, etc., of London, N.W.10, increased by £600 in £1 redeemable preference shares, beyond the registered capital of £100.

DAVIES & METCALFE, LIMITED, engineers and steam injector manufacturers, etc., of Romiley, nr. Stockport (Ches), increased by £50,000 in 10s. ordinary shares, beyond the registered capital of £100,000.

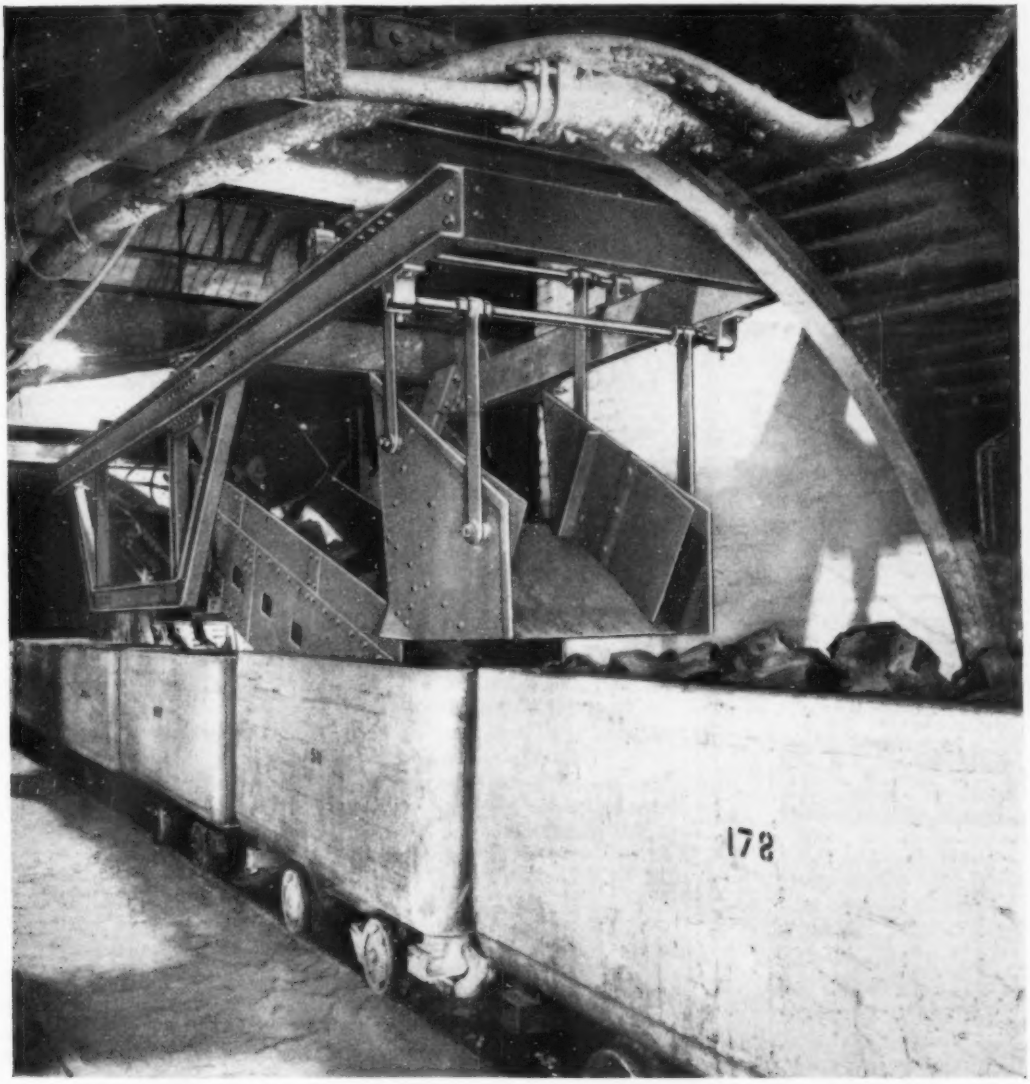
FOUNDRY SERVICES (HOLDINGS), LIMITED, Birmingham, increased by £400,000 in 200,000 "A" ordinary shares and 200,000 "B" ordinary shares of £1, beyond the registered capital of £200,000.

G. H. CHAPPELL SONS & COMPANY (METAL MERCHANTS), LIMITED, London, E.10, increased by £10,050 in 9,800 5 per cent. redeemable preference and 250 ordinary shares of £1 each, beyond the registered capital of £2,450.

SANDERSON KAYSER, LIMITED, steel goods merchants, and manufacturers, etc., of Sheffield, increased by £1,240,000 in 140,000 preference shares of £1 and 2,200,000 ordinary shares of 10s. each, beyond the registered capital of £510,000.

A. & F. PARKES & COMPANY (LONDON), LIMITED, galvanizers and merchants, etc., of London, E.C.3, increased by £29,900 in 24,900 ordinary and 5,000 6 per cent. redeemable preference shares of £1 each, beyond the registered capital of £100.

METAL CLOSURES GROUP, LIMITED (formerly Metal Closures, Limited), increased by £2,335,000 in 324,000 6 per cent. cumulative preference shares of £1, 3,824,600 ordinary shares of 1s and 7,279,080 ordinary shares of 5s. each, beyond the registered capital of £1,665,000.



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Candidates must either hold a degree, preferably in Mining, or equivalent qualifications, with special knowledge and experience in the fields of coal preparation and fuel technology.

An additional appointment as Lecturer may be made for which at least an H.N.C. in Electrical Engineering or equivalent qualification, with experience in electrical engineering at collieries, should be held.

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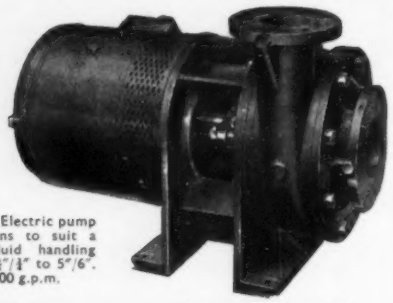

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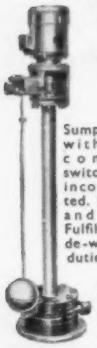

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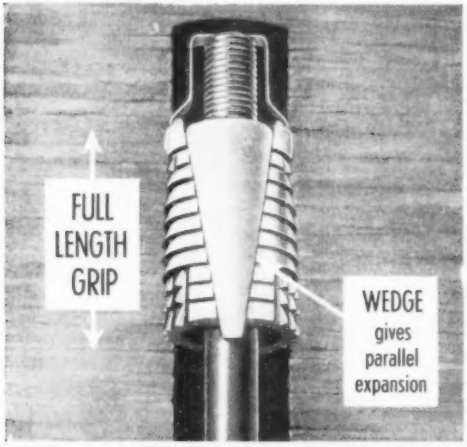

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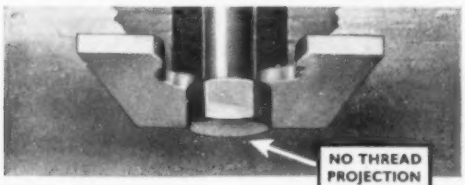

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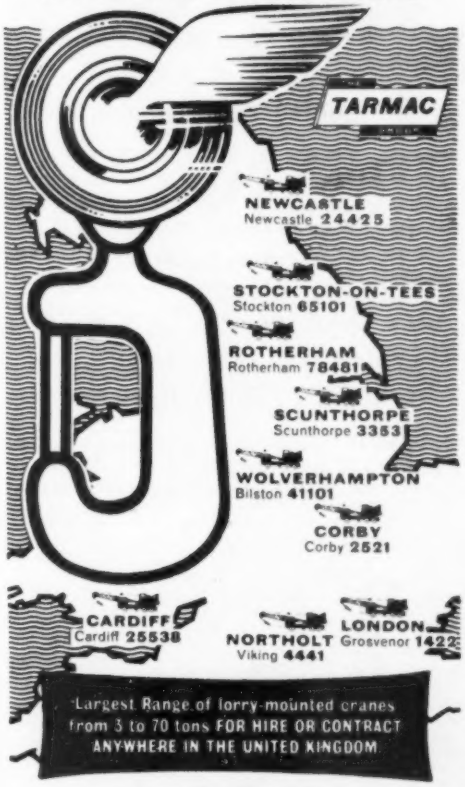

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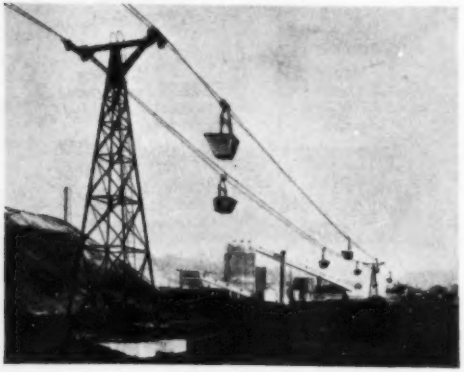

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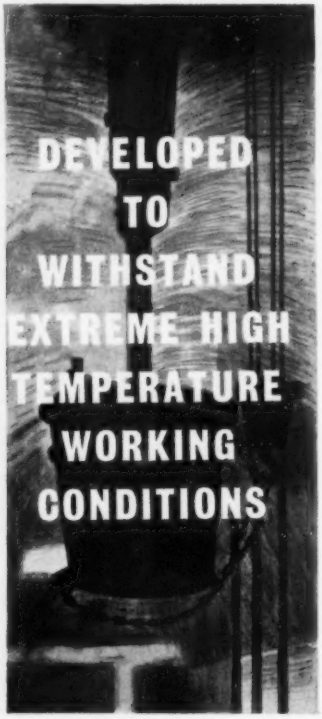

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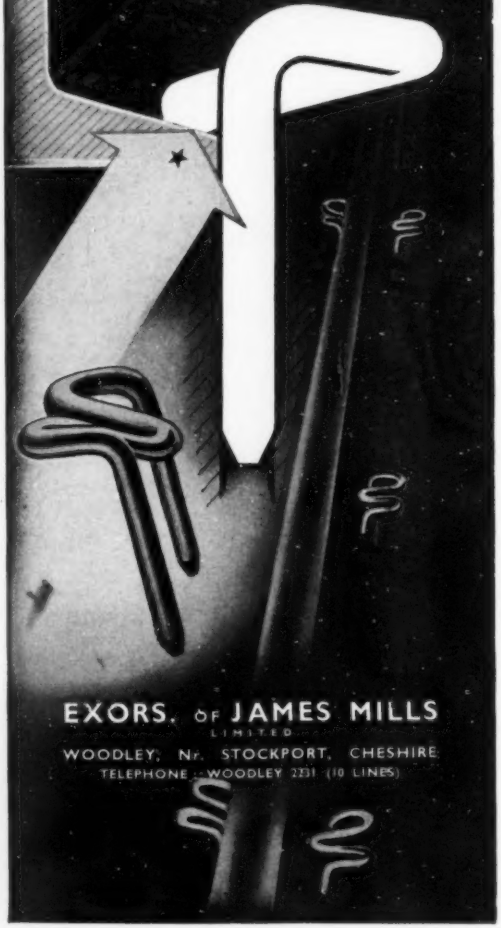

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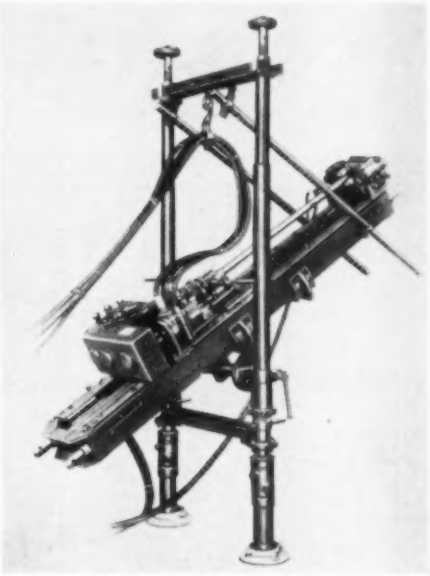

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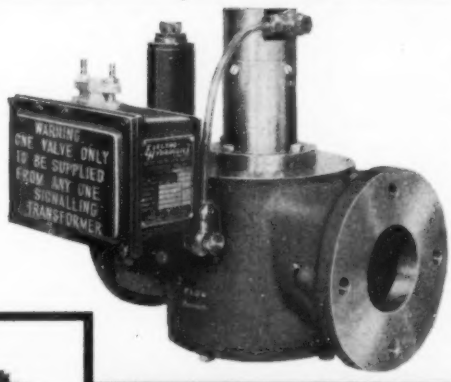

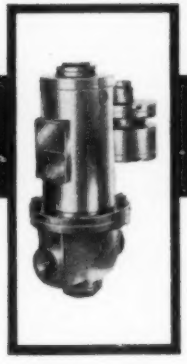

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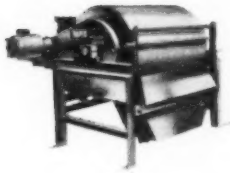

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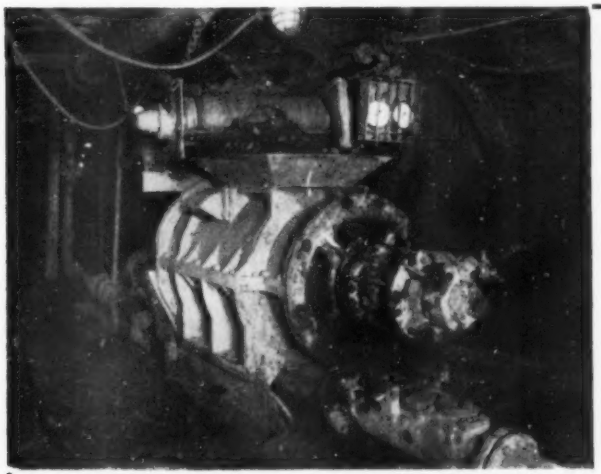

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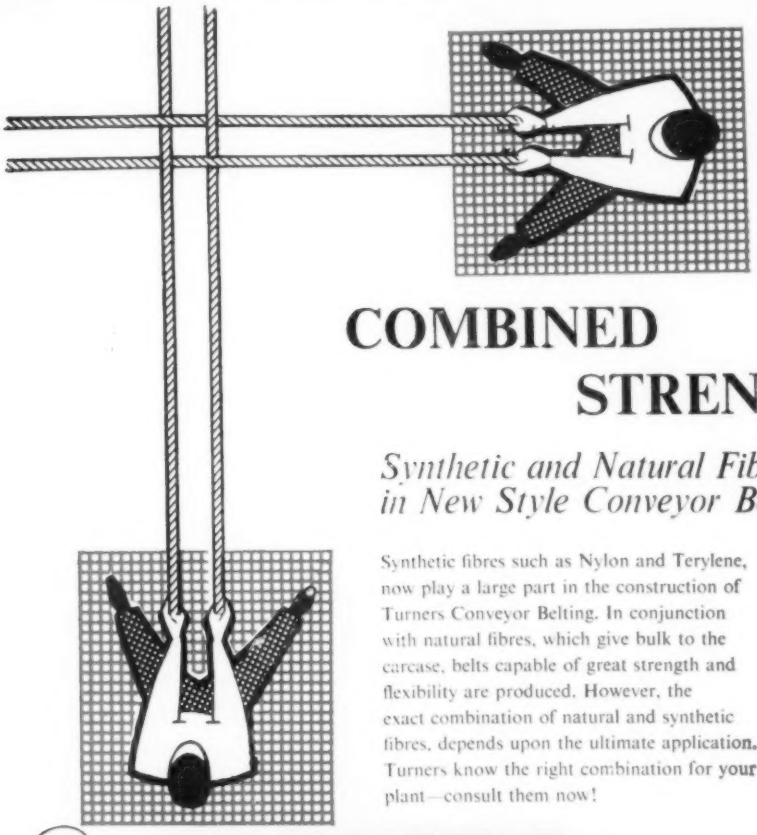

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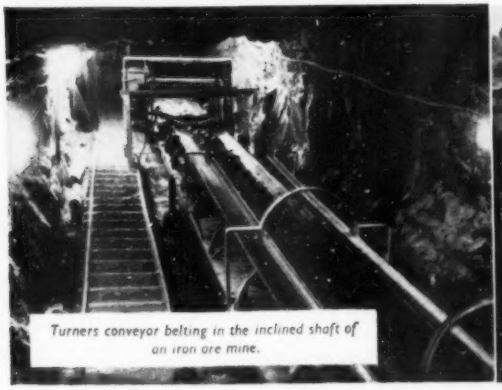

Turners conveyor belting in the inclined shaft of an iron ore mine.

Turners heat resisting belts handling granulated basic iron at Stewarts & Lloyds Ltd.

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IRON & COAL

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